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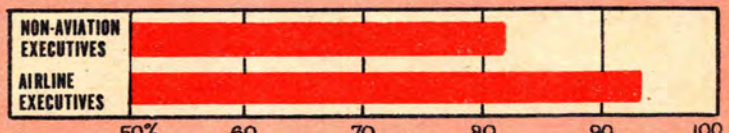

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Cover: England's Avro 698 delta wing bomber. Only one extant. Well past experimental stage, craft has high production priority. Service type will be powered by four Olympus jets of 10,000 lbs. thrust plus. Painting by S. Calhoun Smith.

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FOR THE READER

AIR NOTES 10
R/C ROUNDUP—HOWARD G. McENTEE 12
AIRMEN OF VISION 14
CIVIL AIR PATROL CADETS 16
FIFTY YEARS OF FLIGHT 19
THE DAY WE STOLE THE MIG 20
—C. B. COLBY; ART BY TINSLEY
THE WORLD A-WING 22
AIR PROGRESS: L'ARMEE DE L'AIR 24
FRANCAISE—DOUGLAS ROLFE
NO TIME TO KILL!—J. L. H. PECK 28
HALF-PEP RACER—TED GRZESZCZAK 30
HOUN' DOG—JACK MACY 32
DYNA-JET STORY—DOUGLAS INGELLS 34
TIPPY TIM—AUBREY KOCHMAN 36
PLANNING YOUR R/C SET-UP 38
THE R/C BUYER'S GUIDE 39
DOPE CAN—THE DOPESTER 40
CONTROL LINE RETRACTING GEAR 40
MINOR MACH—FRANK EHLING 41
SKETCHBOOK AT THE NATIONALS 44
SAAB 210 "DRAKEN" IN 3-VIEW 46
OK CUB .14 ENGINE 47
CLEVELAND'S F-84F T-JET 48
MASTER MODELCRAFT'S RACER 48
P.D.Q.'S MESSERSCHMITT 49
KENHI'S COUGAR 49
OS "29" ENGINE 50
"AT" FORUM 52
WESTERN ROUNDUP—DICK EVERETT 62
THE PITCH ON TRUE-PITCH PROPS 64
FOREIGN NEWS NOTES 70
HOW TO PLANK A FUSELAGE 74
SHOWCASE 76
SWEDISH JETS 81

FROM THE READER

From the Air Defense Command . . . The preprint of the Article by General Spaatz interests us very much. I am sure that much benefit can be gained in the Ground Observer Corps program by the employment of scale models both from a training, and from an interest gathering or recruiting standpoint.

The use of plane models in the Ground Observer Corps aircraft recognition training program has been planned for some time and a substantial portion of the requirement for these models is presently under procurement. Sets of these models will be made available in the near future to the military personnel responsible for training observers. The limited number under procurement would, however, restrict their use primarily to specific training missions and would not allow sufficient for other recruiting or interest stimulating programs.

The difficulty this command faces in overcoming the apathy prevalent amongst the greater portion of the civilian population to secure the voluntary effort necessary in the Ground Observer Corps program makes it mandatory that we do everything within our power to gain this much-needed interest. This command would be glad to consider any proposals which you feel would be of benefit in the accomplishment of its primary mission.

Maj. Gen. Frederic H. Smith,
Vice Commander,
Air Defense Command, USAF.

Teaching Aid . . . I was very much impressed by your Air Progress. I am a teacher in the San Francisco Schools and I teach a course in aviation. It is very satisfying to subscribe to your magazine and other flying literature.

Anthony J. Lans, San Francisco, Calif.

Wants Helicopter Meets . . . I would like to see some helicopter contests started here. Either have them as a part of regular contests or have them as a regular separate contest. All the models would be free-flight and could be scored in several things. There could even be a PAA-load helicopter contest. The pay-load would be in the form of litters on the side of the fuselage. There could be endurance, height, beauty flying and non, and scale flying models. The power would be Jetex or gas engines since both can and are being used very successfully as power units. Rubber endurance models and possibly autogiros could be added to the contests. As Mr. Kummers says, construction and originality would be stressed.

There are many skeptics who think that the 'copter model just rises slowly a few feet straight up and just flops down. But a well trimmed light Jetex powered model can really perform well even in winds where gas free-flights are grounded. I have a small Jetex powered 50 helicopter that climbed to over an est. 400 feet and it stayed aloft for 2¼ minutes and flew halfway across the Van Cortlandt Park field.

Bob Tennenbaum, New York, N. Y.

Dreams of Another Day . . . I am an avid and conscientious follower of aviation and I enjoy immensely Air Trails magazine. As a private pilot in civilian life, Air Trails has given me help in giving me concise information, and in my army life has let me dream a little of another day.

Pvt. Charles J. Wilkinson, Jr.,
Fort Lee, Va.

No Clubs in Burlington? . . . Would like to tell you that your magazine is tops in Burlington although there are few dyed-in-the-wool modelers around. It seems the local hobby shop sells lots of engines and kits but most of them are never seen at the flying field. Some mystery, wot! It seems impossible for modelers in these parts to get organized. Clubs were formed about five times, for about two weeks, then no more club.

Warren Weary Smith, So. Burlington, Vt.

One of Tomorrow's Leaders . . . I wish to take this time to tell you just how I feel about your latest publication, Air Progress. I have never seen anything so complete on this subject before for the nominal price asked. This is especially interesting to the youth who will become the leaders in aviation tomorrow. I know, because I am one of that youth. Keep up the good work. My special congratulations to the artists of this magazine.

Henry E. Apgar, Jr., Plainfield, N. J.

Bug Bites Patients . . . I received some plans from you last week and they are just perfect. I sure do enjoy reading your book. When I am finished with my copies I pass them to the other patients and believe it or not it has started some of the fellows in the hobby. The bug has bitten some of them pretty hard.

Capt. Charles H. Middleton, Jr.,
Valley Forge Army Hospital,
Phoenixville, Penna.

They Battle for "A.T." . . . When I get Air Trails (via mail), I am often late getting back to school. I can't work in school thinking about the brief glance I had while eating lunch. After school I read from 3:15 o'clock till my father gets home. The next day no "AT", not for me anyway. Dad's got it where he works and I don't see it again till the end of the week when he brings it home to study the R/C in a more relaxed air. That's when I get my chance at the F/F section.

Louis Crane, Brooklyn, N. Y.

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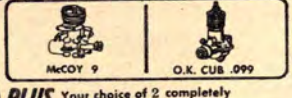

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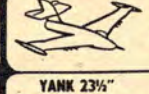

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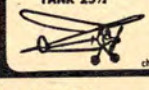

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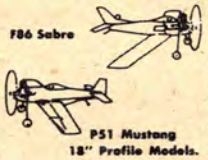

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Air Notes

Water-based Fighters Coming

PICTURED ABOVE is 34 years' progress in flying boat design. Biplane is the famous NC-4 which in 1919 crossed the Atlantic; alongside is Consolidated Vultee's latest project, the Beta, a supersonic flying boat featuring blended hull and wing design. Entire philosophy concerning flying boats has been revised in the last few years; whereas in the past water-based aircraft were not considered practical due to greater weight in comparison with land-based planes, this margin has now practically disappeared in view of the fact that weight of landplanes has been rapidly growing upwards.

★ ★ ★

MOONEY to produce a four-place cabin personal plane that will have laminar flow wing, 160 mph cruising speed, 21,000 ft. ceiling. . . . FAIRCHILD signed up with Fokker of Holland to build the Fokker S-14, two-place side-by-side trainer. . . . CONVAIR YB-60, swept-wing, eight-jet version of the B-36, will not go into production. USAF decided to use the Boeing B-52 instead.

★ ★ ★

JAPANESE AIR LINES ordered two de Havilland Comet II jet transports and three DH Herons. . . . TEMCO is overhauling and re-vitalizing more than 200 Republic Thunderbolts for USAF. . . . CONTRACT for the development of turboprop engine has been awarded to the Lycoming-Spencer company, manufacturers of Lycoming engines, by USAF. . . . THE LATEST version of North American Aviation's Sabre, the F-86H, to be manufactured at the company's Columbus, Ohio plant.

★ ★ ★

TRANSOCEAN Airlines have sold one of their DC-4s to King Ibn Saud of Saudi Arabia. Plane will be a veritable flying palace, equipped with throne, royal bedroom and boarding elevator.

★ ★ ★

COMPLETE SURPRISE to aviation industry was purchase by Pan American World Airways of three de Havilland Comet III jet airliners. Deliveries will begin in early 1956. This can mean only that PAA does not expect U.S. aircraft manufacturers to come up with an American jet transport design before then. Comet III, somewhat larger than the type now in use by BOAC on its African and Far Eastern routes, is expected to accommodate 58 first-class passengers or 78 tourist class. It will be equipped with the more powerful RR Avon engines of 9000 lbs. thrust each. The speed will be in the neighborhood of 500 mph, and still air range, 3000 miles.

★ ★ ★

PUSHBUTTON WAR was largely ballyhooed by Navy's announcement that bomb-carrying, radio-controlled Grumman Hellcats, monitored by Douglas AD's, were used to destroy enemy installations in Korea. Announcement gave impression that this was the first use of such weapon in actual warfare. Lest we forget, radio-controlled, war-weary B-17's and B-24's loaded with explosives were dived into German factories during WW II, and a true air-to-ground guided missile, the "Bat," was used against Japanese shipping launched from Navy PB4Y-2 Privateers. . . . BURNELLI airfoil fuselage transport and cargo planes will probably be built by the newly established firm Air Lifts, Inc., Coral Gables, Fla. Designer Vincent Burnelli to serve as chief engineer.

★ ★ ★

SECOND XB-52 eight-jet bomber made its maiden flight at Boeing-Seattle plant. . . . SWEDEN placed order with de Havilland Aircraft for a number of Venom jet night fighters. . . . FIFTY passenger helicopters for airline use will be available by 1960, said Frank Piasecki, of the Piasecki Helicopter Co. According to him, transport helicopter design has advanced to the point where it can replace fixed wing plane on inter-city trips up to 350 miles in length, starting as early as 1957.

★ ★ ★

FLYING SOLO a distance of 1234 miles nonstop in a Bell 47D-1 helicopter, Elton J. Smith, Bell test pilot, established new world record for rotary wing aircraft. Flight was made from Fort Worth, Tex., to Buffalo, N.Y. . . . KOREAN war veterans who want to learn to fly can now get three quarters of their flight training cost paid by the government, under recently enacted G.I. Bill. . . . AERODYNAMIC forces exerted on a supersonic fighter are so great that the plane's power control system must be capable of exerting 100 times more pressure on the control stick than can a human pilot. . . . FIRST metropolitan New York scheduled air mail and postal service was inaugurated by a New York Airways, Inc., Sikorsky S-55 between La Guardia Field, Newark Airport and Idlewild. Eventually operation will expand to carrying passengers to points in Long Island, New Jersey and Connecticut.

★ ★ ★

IF you are a follower of air race and racing plane history we recommend the recently issued book "American Racing Planes and Historic Air Races" by Reed Kinert. Profusely illustrated in color and black and white and full of facts and tables, it covers all air races from the First International Air Meet at Rheims, France, in 1909 to the 1951 National Air Races. Published by Wilcox & Follett Co., New York and Chicago.

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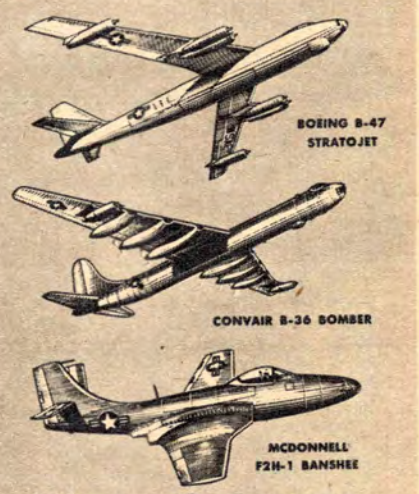

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R/C "Picnic" Brings Out 50 Fans

■ Guess we are now reaching the building and experimenting season, at least those of us in the northern part of the country. However, there are still a few contest results trickling in, so let's look them over. Claude McCullough reports that results of the R/C event at Ames, Iowa, meet were: 1. Paul Jones (Cedar Rapids), Rudderbug with Atwood .49, Good Bros. radio with pulse operation. 2. Merrill McCoy (Des Moines), original with pulse, 27¼. 3. Ken Satterlee (Waterloo), Live Wire with McCoy .09, Macnabb 465 & esc. Mac was pressed into service as a judge, since he had no ship flying. Judging was on the Good-Fair-Poor system, as used at the Nats in 1952. Contestants felt it was very fair—better than the Excellent-Good-Fair-Poor system, and much better than the numerical system of judging maneuvers, which has been standard for years.

Another letter from Mac (yep, he's one of our really good correspondents!) gave details of the R/C Picnic held on his farm near Ottumwa. Fifty R/C enthusiasts showed up with 15 planes, the latter ranging from 38" up to an eight-footer. Jack Williams, an ardent radio flyer who also runs a dairy, supplied gallons of ice cream; Paul Johnson stowed away a full gallon of this! Mrs. Williams, who has her own R/C ship on the way, moulded an original plaque, a copy of which went to each person attending the "Small Corn Meet," as it was called.

The National Model Yacht Radio Control Championships were held at Everett, Wash. Francis Reynolds won, using Macnabb 465 mc. equipment to control an electric motor moving the rudder. Now the boys are working on means to race a number of boats simultaneously, rather than one at a time, as they have to do at present.

Clubs and People. John Cochrane, Brentwood, Mo., writes that Sunday flying is done at Parks College airfield, which is not too good for F/F, but fine for R/C. John built the A.T. Annual receiver and found that wrapping the tube with aluminum foil connected to a filament lead removed all signs of hand-capacity effect and gave a little better receiver action. His unusual plane design was shown in the "Sketch Book," Nov. issue, and he has now built another of the same type with Macnabb radio. He is using 75 V. B. on the receiver and finds it much more sensitive, with a greater plate current rise.

The DC/RC Club now meets third Friday each month at Lake Model & Hobby Crafts, 11156 Georgia Ave. Silver Spring, Md. There were 28 members at the first meeting at this new location. Officers are: Pres., Don Clark; V. P., Jim Reed; Sec.-Treas., Bill Nesbitt; Club Adviser, Walt Good. A good flying spot near Washington, D. C., has been made available to club members.

Q & A. Harry Wells, San Antonio, has some RK61's and wants to use them in the A. T. Annual receiver, instead of the specified XFG-1 tube. He wonders if R1 and C3 should be changed. They shouldn't, but by changing L1 to 20 turns of #24 en. wire, tapped 6 turns from the grid end, and using about 7 mmf. for C2, the receiver will work well with both RK61's and XFG-1's.

David Lassaline, Detroit, wonders if the A. T. Annual receiver may be used on 220 mc. Nope—it won't work much higher than 50 mc., and will naturally need different circuit value even for this use. The escapement is hooked to one lug you will find on the frame of the relay near the little coil spring, and to the upper contact lug (the right hand one in the drawing). Two escapements may be used with one receiver, if one of them has a set of contacts that may be closed in one position. The English E.C.C. and E.D. escapements have this feature, as does the Bonner Compound.

Arthur Kubicz, Detroit 34, Mich., wonders if R/C speed or stunt are feasible with present-day equipment. Presume he means stunt (beg pardon—guess it's called precision now) in a closed pattern as accomplished by the contest controliners. Well, some of the boys are able to do fine loops, stalls, spirals etc. Also, the hotshots can turn in rolls upon demand, and some of them can do very nice inverted flight. Of course, considerable altitude is used for this sort of thing. As for speed, a well-trimmed ship could probably be taken around a closed course with fair precision; in fact there is a juicy prize for a contest event of this sort, though we haven't heard of one being run off so far.

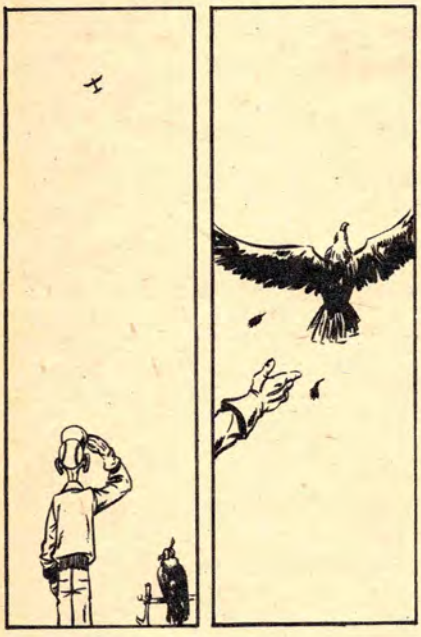
Art asks if there are any dangers in using more high-powered ships for R/C than are now generally being flown. Well, we can quote from the remarks on this by a fellow who has tried it. Lew Errington, Fred Collins, and others of the Pittsburgh Flying Circuits have been using Rudderbugs fitted with hot .60 engines. These really *go*, and as Lew says, when everything is working right the results are spectacular—but if anything goes sour, brother, you've had it! Lew says that after flying these R/C bombs all summer, and spending a good deal of the time on repairs, he has come to feel that it is a lot more sensible to use normal power, for with it you spend a greater percentage of your time flying, and less patching up the wreckage.

George Helmsdoerfer, San Francisco 14, Calif., wants to know how to avoid interference when several transmitters are at the same field. On 27¼ you can't do it, since this is a spot frequency, and all equipment is on the one spot. If you are working any of the ham bands (a ham license needed for this) you have more leeway.

The 50 mc. band runs from 50 to 54 mc, and with careful tuning it is possible to work two or three of some types of receivers in the band at once without interference. 465 mc. is also a spot, so only one at a time can be operated here. However, simultaneous operation of several planes is possible by having each one on a different band, say 27¼, 50, and 465. Don't forget also that receivers often put out quite a strong signal; they act as miniature transmitters, and a receiver on the ground can interfere with a plane in the air at quite a distance, if conditions are right (or maybe we should say wrong).

Technical Matters. Seems that a great amount of interest has been aroused by that hard-tube receiver we had in the October issue. Comments have come in from many corners; some have tried it with good results, some with poor. Alec Burns, Mimico, Ont., Canada, notes that the circuit is very similar to one known as the "Bolton" (*Continued on page* 73)

New Trend in Retrieving



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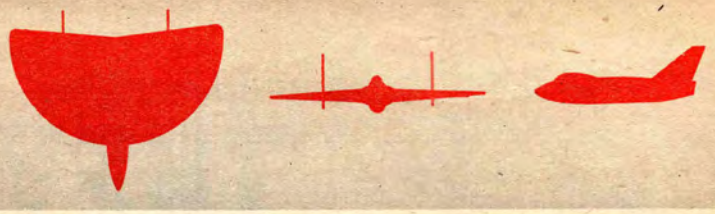
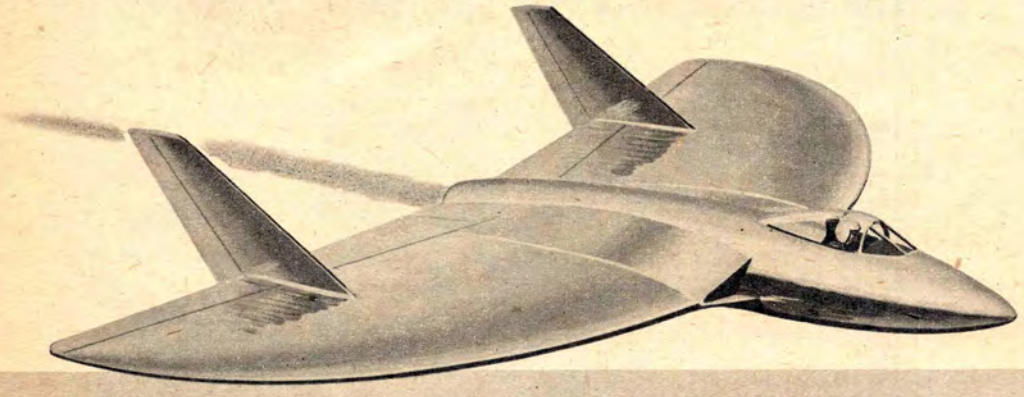
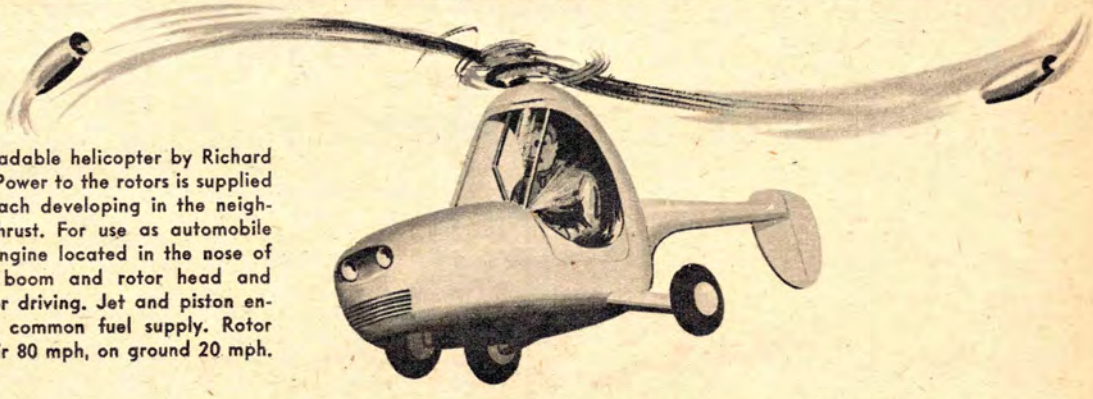




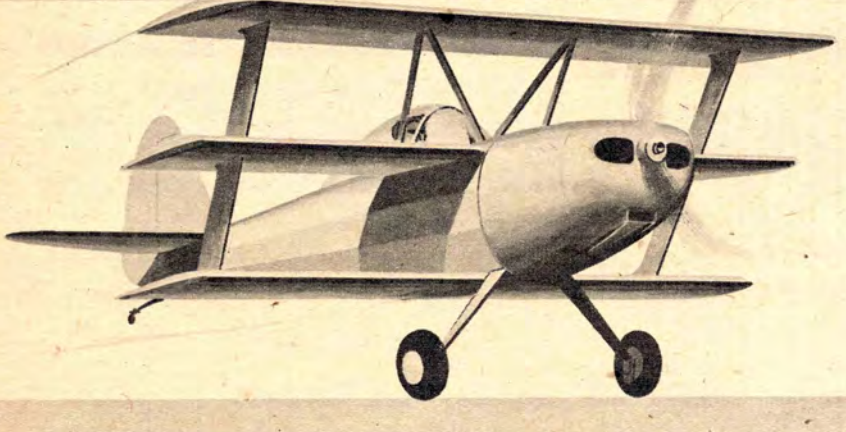
Top of the list this month is this unusual sonic research plane by Robert De Lillo of Brooklyn, N. Y. Notable is the semi-circular shape of the wing. Whether such a shape is as good or better than the delta is dubious. However, the purpose of the aircraft is to test the theory. There have been several circular wings built in the past, best known of which was the Czeranowski "Parabola." Span of Batwing is 25 ft.

2ND AWARD
Roadable ramjet helicopter



A single-place, ramjet roadable helicopter by Richard Sotelo of El Paso, Texas. Power to the rotors is supplied by two ramjets at tips each developing in the neighborhood of 50 lbs. of thrust. For use as automobile there is a small piston engine located in the nose of the fuselage. Rear tail boom and rotor head and blades are dismantled for driving. Jet and piston engines are fed from one common fuel supply. Rotor dia. is 23 ft. Speed in air 80 mph, on ground 20 mph.

3RD AWARD
Sport and aerobatic triplane



Omer Blosser of Boomer, W. Va., submits the dream of all aerobatic pilots, a neat triplane. Such design is eminently suitable for stunting as short wingspan gives excellent maneuverability combined with a generous wing area. Blosser gave his tripe a wide gap between wings to minimize interference losses. The ship is very clean with its cowled-in 125 hp flat four engine and single-leg landing gear struts. Fighter type cockpit enclosure adds to pilot comfort as well as reduces drag. Top wing has span of 24 ft., mid-wing 22 ft. and lower wing 20 ft.

AIRMEN OF VISION DESIGN COMPETITION

Rules governing the "aircraft of the future" competition are as follows: Three-view sketches of the proposed aircraft will be required. These should be not less than 8½x11 inches for the entire three views. Give sketches of the complete airplane in three-quarter front and rear positions. Photos of a model of proposed designs may be included. Information on the power plant(s), estimated performance, dimensions, and explanations of any unusual features are required. Data as to age, occupation or schooling of the entrant will be welcomed by the editors and judges. The design may be of any type: commercial aircraft, military planes (fighters, bombers, troop transports), planes for the private flyer and single-engine sporting or racing craft. The entry each month judged the most practical or of the greatest significance will receive an award of $25. Payment of $5 will go to runner-up. Entries will not be returned and for that reason those participating should keep copies of all material submitted. Mail entries to Airmen of Vision, c/o Air Trails, 304 E. 45th St., New York 17, N. Y. Editors regret that due to large number of entries they cannot enter into any correspondence on Airmen of Vision.

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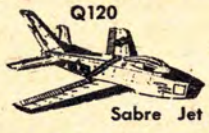

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R/C NEWS

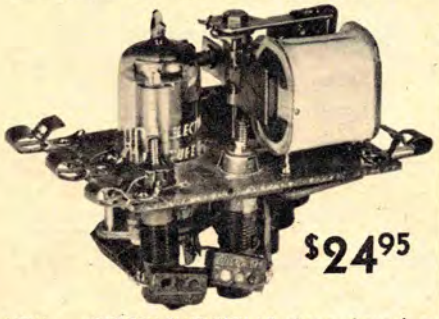
Announcing NEW 27.255 & 465 CITIZEN-SHIP

By
Vern C. MacNabb

NEW . . . **CITIZEN-SHIP** announces two revolutionary new radio control systems—

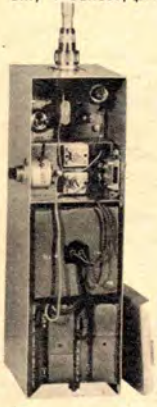
1. NEW **CITIZEN-SHIP** "27" LR radio receiver and LC transmitter on the new "examination free" 27.255 kc frequency.
2. NEW . . . super sensitized **CITIZEN-SHIP** CR radio receiver on the original 465 mc Citizens band with its reliable model CC transmitter.

Original receivers were adjusted to operate up to ½ mile; but occasional reports from modelers revealed reliable control up to 2 miles. Investigation of these amazing feats led to the development of a revision of circuit constants that **increased sensitivity FIVE TIMES.** All **CITIZEN-SHIP** CR receivers shipped in the last several months have this quintupled sensitivity.



$24.95

NEW . . . **CITIZEN-SHIP** "27" LR, shown above, is a hard tube (3V4) receiver giving a 5 to 1 plate current change assuring dependable operation with a Sigma 4F adjustable relay. Has indestructible fiber glass base 2½ x 1¾"; height of unit 2¼" and weighs only 4 ounces; price **$24.95**



By using same type tube 3V4 in BOTH receiver and transmitter, one spare tube simplifies possible service replacement in use. They may be readily obtained from any radio parts jobber or hobby shop featuring R/C equipment.

NEW . . . **CITIZEN-SHIP "27"** LC hand held transmitter (shown at left) for use on new "examination free" 27.255 kc frequency is completely self contained. Using a 3-section plug in antenna 48 inches long and two 3V4 tubes it gives extra high radio output. Factory tuned and adjusted for optimum performance. Weighs just 4 lbs. complete with batteries; dimensions 3" x 4" x 9". Complete with tubes and crystal, price less battery . . .

$39.75

The only producer of equipment for
BOTH CITIZENS BANDS
465 mc and 27.255 kc

RECEIVER model CR for 465 mc Citizens band; ready to "fly out of box" **$29.95**

TRANSMITTER model CC for 465 mc Citizens band; self contained; factory adjusted; ready to use; less battery **$39.75**

Citizen-Ship SN escapement	$ 9.95
Good Bros. 4 position escapement	13.50
Citizen-Ship Test Meter	19.95
Bell Crank and Rudder Horn	.75

VERNON C. MacNABB CO.

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CLEAR! SWITCHES ON! Learning the proper warm-up procedures, Cadet Ed L. Strickland of Galveston signals from cockpit while Cadet J. Hartfelder of Dallas stands by with CO.

Patrol Members Fly as Plane Captains in Search

A flight operation planned and run by CAP Cadets of the Squadron in Fairfax County, Va., has set a likely pattern for all areas. The problem was search and rescue, not hitherto open to Cadets except for ground assist because of the dangers in low flying over rocks and woods.

Hazards were removed by setting a closed course with plenty of hayfields within gliding distance in emergency. The fastest planes were dispatched first so there could be no chance of collision. All flights were at 1,000 feet above terrain instead of 500 as in actual search.

Each Cadet, boy or girl, flew as captain of a plane piloted by a senior member of CAP. Of 30 on the mission, 28 went around the circuit.

Applying the knowledge gained in navigation classes and in previous flights, the Cadet aloft had to tell the pilot where the course lay, from a map, and see that the plane kept on it.

The object of search was a parachute and an "injured" person nearby. A message panel asked for medical aid and another warned not to land. The searching plane was allowed to deviate as much as half a mile from course to find the simulated wreck, and could circle not more than twice to read the signals.

Most of the Cadet observers spotted the target. Next step was to send a ground rescue crew with stretchers and the know-how gained from the Red Cross course given to the Cadet Squadron. The exercise, from the Falls Church, Va., airpark, was supervised by Lt. Eleanor Davis, Commandant of Cadets.

On the previous week-end, Cadets at many fields helped in the semi-annual SARCAP (Search and Rescue, CAP) conducted by the adult organization in all parts of the country. This writer searched a 10-mile square and at each fueling stop found a crew of uniformed Cadets ready to roll the airplane to the gasoline pit. Cadets also were operating radio equipment and otherwise taking responsible part in practice for real search which may be needed at any time.

The Air Force reimburses plane owners for gasoline and oil consumed on these official CAP missions.

The 100,000 goal for the CAP Cadet program is still less than half filled. Latest figure stood at about the level reached in mid-1952.

CAP Headquarters plans to drive for the full quota by Dec. 17, 1953, the 50th anniversary of the Wright Brothers' first flight.

One factor that will make the quota in each state easier to attain is the new policy of keeping Cadets till their 21st birthday instead of their 19th. In the past, thousands have left the program each year on passing the age of 18.

Although Senior membership has been open to them, there is no adult training program in CAP comparable to the planned series of courses given the Cadets. The majority of Cadets have not been joining the senior CAP, currently at less than 30,000 members.

Keeping them through 20 not only stabilizes the membership but gives the Cadets trained leaders who may have started as early as 14½. Advanced

Join the Civil Air Patrol—the civilian auxiliary of the U. S. Air Force. Cadets are 14½ to 17; seniors, 18 and above.

C. A. P. NEWS c/o Air Trails
304 East 45th St., New York 17, N. Y.

I'm interested in more information on the CAP and would like to hear from my nearest unit.

Name .....

Address .....

City (and zone) .....

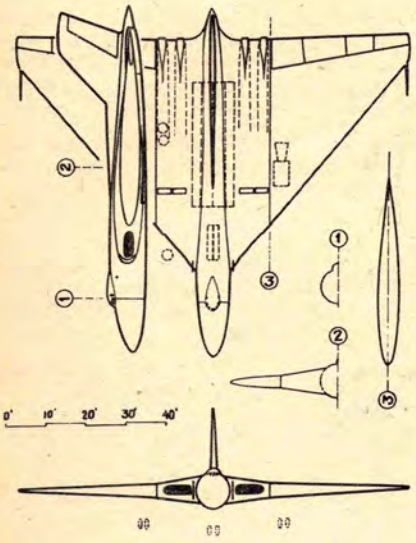
State ..... Your Age .....

Air Trails, Jan. '53.

Cadet courses, including radio as well as preflight subjects, are being added. The older Cadets, of course, can attain private pilot licenses and fly.

Air Reservists are now recognized as the key to further expansion of the CAP Cadet corps which seems to have reached its level as far as civilian volunteers can make it go.

Many Reservists already are instructing in CAP and getting official credit points for promotion and retirement. Limiting the credit to instruction, however, give no incentive to work in the general development and leadership of the program.



AVRO 698

British four-jet delta bomber. Large bomb load, fine maneuverability are features.

One method tried in several areas, and gaining favor for wider use, is to form units of the Volunteer Reserve and have them made at the same time Squadrons of CAP. Thus the Reservists can fly CAP airplanes, operate radios, and otherwise get practical training which the current Reserve program does not offer.

Cadet Squadrons attached to such units get a high type of instruction from veteran officers and airmen. The test unit in Washington, D. C., is giving a slightly simplified version of commercial pilot ground school.

Another method may be to open mobilization vacancies where Reservists can serve in key spots within the CAP system for possible call to active duty there in case of emergency.

A similar plan is being considered for placing Reservists in the Ground Observer Corps. Concurrent authority of CAP to act as the air arm of civil defense does not make the job harder; rather it gives enough interesting and useful work to hold its members.

CAP's new airplanes have been distributed to the Wings for sharing among local units, to help Senior members keep up their flying skill and to give the feel of flying to Cadets.

Some 335 L-16 Aeroncas, all in good condition, have been added in recent months to some 300 L-4 Pipers and Stearman trainers previously isued on-loan to CAP by the Air Force.

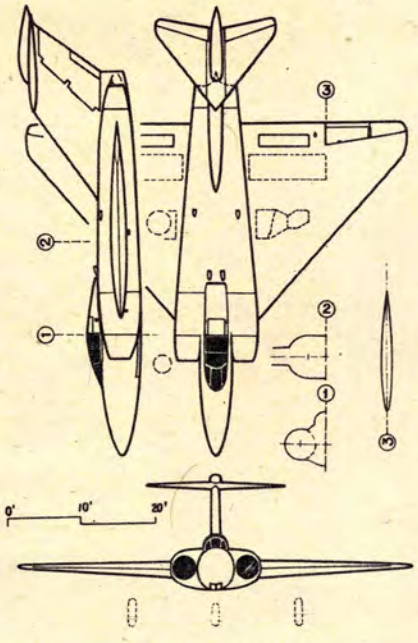
Max Conrad, whose 27,000 logged hours of flight is considered the record, was awarded a lifetime membership in CAP for his work in bringing young people into aviation. At his flying school at Winona, Minn., he has personally soloed more than 500 students.

More than that, he has given work to at least one promising youngster each year. No less than 40 of them are now flying as captains on major airlines. Many of his other students are highly placed in various branches of aviation.

The father of 10 children of his own, Mr. Conrad has showed what light planes can do in his two crossings of the Atlantic, as well as in non-stop flights from Mexico City to Washington and from Los Angeles to New York.

Air Explorer Scouts, together with CAP Cadets, are busy learning the duties of an Air Defense Filter Center in Knoxville, Tenn., important because of close proximity to the Oak Ridge atomic plant and other vital war installations.

More than 60 of the Explorer Scouts are training under Regular Air Force instructors for assignment to the two operating teams supervised by Senior Explorer Scouts who are members of the University of Tennessee ROTC units.



GLOSTER JAVELIN

All-weather interceptor-fighter, in supersonic class. 2 Sapphire jets: 17,000 lbs. thrust.

A subsidiary group of younger Scouts is being trained in aircraft spotting and ground observer procedures. They are proving apt pupils, Air Force reports indicate, because of their familiarity with modern aircraft types fostered by their interest in aeromodeling.

A New Year is a time to make new resolutions—to plan more successfully for the future than for the past.

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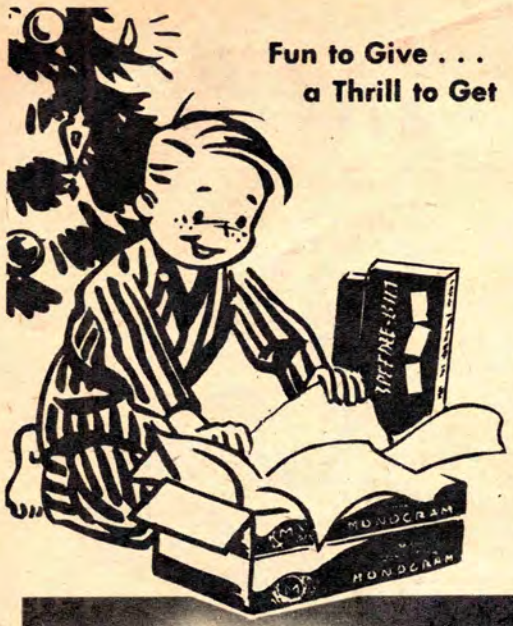

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for a Merry Christmas

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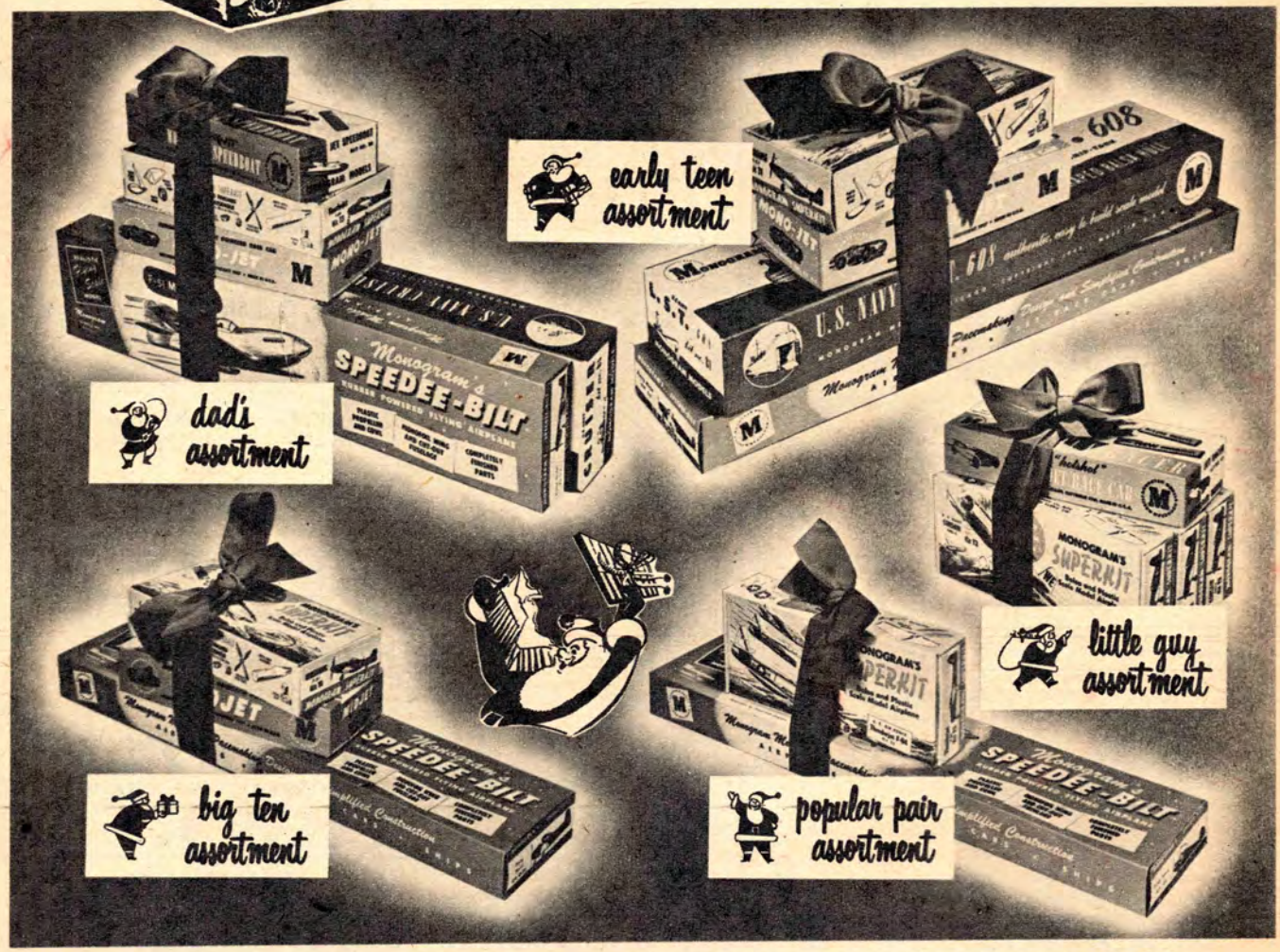
Tell dad and mother you want Monogram Models. Better still . . . take them to your neighborhood model and hobby store to see the exciting Monogram Model Kit Assortments. Then pick out the assortment you want for the merriest Christmas you ever had.



At Your Favorite Model and Hobby Store . . . Typical Gift Assortments of Monogram Models.

Dad's Assortment
Fine for dad and boy model-building team work. 5 Monogram models—Aqua-Jet Speedboat, Superkit solid scale airplane (choice of 3), Monojet racer, U. S. fighting ship (choice of 5), Speedee-Bilt flying airplane, (choice of 15). $4.44

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Fun for fellows 12 years and older. 4 Monogram models—Superkit solid scale airplane (choice of 3), Monojet racer, U. S. fighting ship (choice of 5), Speedee-Bilt flying airplane (choice of 15). $3.84

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Beginners especially, enjoy these easy-to-build models. 4 Monogram models—Hot Shot jet racer, 3 Superkit solid scale models—Corsair, Thunderjet, Mustang. $3.37

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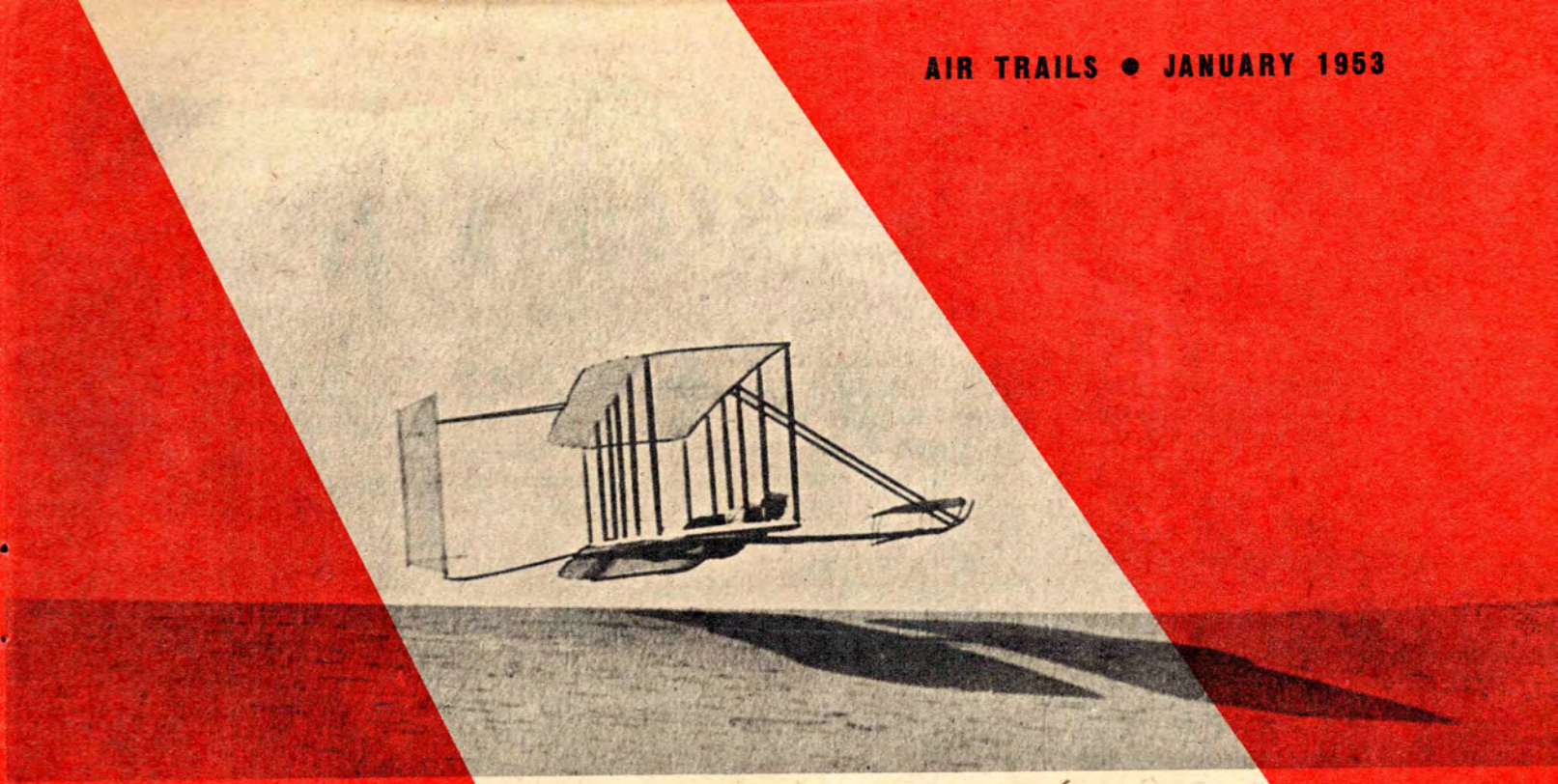
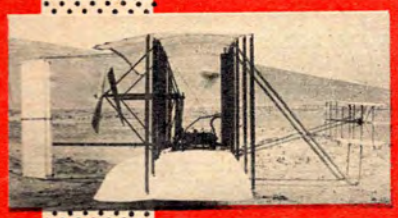




"Very modest compared to the birds" was the comment of the Wright Brothers in reference to their epoch-making flight across the sand dunes of Kitty Hawk a short half century ago. Yet fifty years later every lightplane that hops off from the local airport, every giant airliner that spans the ocean with its payload of passengers or freight, every supersonic fighter and jet bomber

Fifty Years of Flight

harkens back to the wood, wire and cloth Wright Biplane. However, this flimsy machine was produced only after years of countless experiments in wing design, in the problems of balance and control, and was finally made possible because this talented pair could produce their own powerplant. The Wrights made more than 1,000 glider flights between 1900 and 1903; indeed, their interest in man's fight to fly dated to the 1880's when as boys they constructed awkward helicopter models. This year the world of aviation will celebrate the golden anniversary of flight and pay tribute to the two men who accomplished the first man-carrying flight on December 17, 1903. (The large photo is a Wright glider of 1902; the small inset is the famous Biplane now in the Smithsonian; both pictures were taken at Kitty Hawk, N. C.)

The Day We Stole a MiG

■ The pilot of the Fifth Air Force reconnaissance plane swooping across the blasted landscape of North Korea spots a crashed aircraft below. He flies lower for a routine check for survivors and to identify the aircraft if possible. It seems to be an American F-86 Sabrejet with sharply swept-back wings. The nose is bashed in, there are no signs of the pilot. The pilot of the "recon" plane takes another look at the tail, high and rounded with the elevators set close to the top, and at once that battered aircraft smacked into the soil of North Korea becomes the most important piece of twisted metal in the world—at least as far as the Pentagon is concerned. For it's the first Russian MiG fighter plane that crashed with anything left to salvage, and in a place where salvage *might* be accomplished.

Radios, wires and teletypes grow hot all the way from that "recon" plane to Washington and back, and the net result is the terse directive: "Get it, at any cost, but *get that MiG!*"

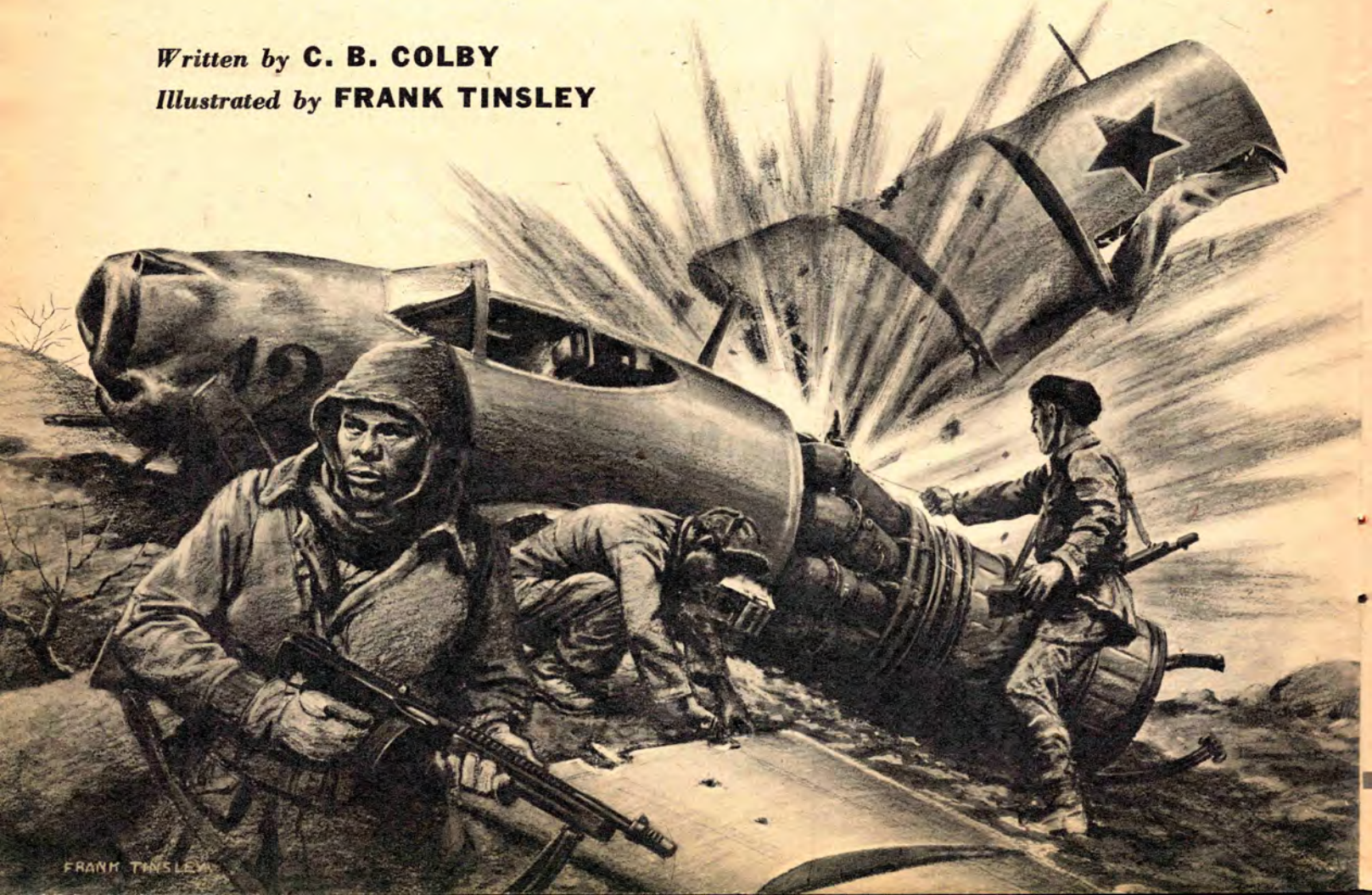
This is at a time when the mysterious and elusive Russian MiG jet fighter, an unexpectedly effective enemy aircraft, whether flown by North Koreans, Red Chinese, or "others," has been raising havoc with the United Nations forces for many months. From USAF and other combat pilots' reports of many encounters with the MiG, our top technicians have been able to learn much about its performance and construction, but a great deal is missing of vital importance. How much of the aircraft is armored and where? What is the thrust of the engine? Where are pilot blind spots if any? And even though our fighters have an edge in encounters with the MiG, is it because of a combination of better pilot and plane—or just our pilots even though flying inferior aircraft?

There is only one item of equipment in Korea capable of bringing back that MiG. At the time it is the sole Sikorsky H-19 transport and cargo helicopter in the Korean area. This big awkward-looking affair weighs over four tons, can carry 10 passengers and crew or eight litters and one attendant and crew, or cargo. It can fly over 200 miles and back. If anything can bring back that MiG, the lone H-19 will have to do it.

General E. E. Partridge, commanding the Fifth Air Force, at once reclassifies the H-19 "expendable." Captain Joseph D. Cooper, pilot, and Captain Russell Winnegar, co-pilot of the craft, are to take help, salvage equipment and the H-19 and bring back as much of the MiG as possible. Fighter protection will be furnished, but as there will probably be only one chance at salvage

Written by **C. B. COLBY**

Illustrated by **FRANK TINSLEY**



From deep in Red territory, USAF brings home a prize package

they may have to fly the H-19 to death with overload and excessive speed.

A few hours later, early in the afternoon of a bitter cold March day, the heavily overloaded H-19 takes off. In addition to the pilots, there are an officer of the O.S.I. (Office of Strategic Information) of the USAF and six rugged South Korean soldiers assigned to help with the salvage. Every bit of extra weight has been dumped on the runway, even down to the parachutes and other strictly emergency equipment.

From this un-named base the helicopter flies to a small island off the west coast of Korea where it stops for a last refueling and checking of equipment. It is here that Captain Cooper regretfully decides that one soldier will have to be left behind. Even so when the craft lifts its four wheels from the runway again it is still a quarter of a ton overloaded by normal measures. From this island Captain Cooper sneaks toward the mainland at low altitude, picks up a coastline check point and turns inland, climbing to 5000 feet. At about this time from scattered fields along the southern edge of the 38th Parallel rises a force of 50 jet fighter aircraft as his protection, to meet him over the target. Things are coming to a boil and fast.

At a point 35 miles behind the Communist lines the vapor trails of the fighters break from their arrow-straight paths and begin to circle their way over a tiny speck far below; the big H-19 settling into the target. As Captain Cooper jockeys his helicopter into a clearing about 100 yards from the wreck he shoots a quick glance at it. It looks practically intact with the exception of the smashed nose section and other minor damage. There are no signs of the pilot, who apparently bailed out some time before the crash or landed with it and then left the scene—they hope.

As the wheels of the helicopter settle onto the ground of the little horseshoe-shaped clearing, Captain Winnegar gives the eager soldiers the word to "go and get it!" They swarm out of the big craft with their metal cutters, wrenches, snippers and dismantling tackle, and dash for the wreck a few yards away. With them races the O.S.I. officer, to direct the salvage, and Capt. Winnegar. Joe Cooper remains at the controls of the H-19 to be ready for any emergency.

The battered MiG proves to be a tougher item than they expected. The men yank, tug, and swear, but still the Iron Curtain trophy refuses to come apart. The ten minutes allotted for the dismantling job stretch to 20. Surely the enemy must have seen the circling cover of fighters and sensed that something of vast importance was going on below them. How long before they come nosing around? In the helicopter, Cooper looks at his watch. Should he give the order to get out of there or wait a few moments longer? Suddenly he notes that the rasping and clanking of metal tools has stopped. It is strangely quiet. Have the men heard or seen something? Almost at once the silence is shattered by sharp explosions nearby. Bombs, mortar shells, or aircraft attack? The pilot prepares for instant take-off should the men come running. ("I thought the balloon had really gone up on this deal!" he reports later when telling of the noise of the explosions.)

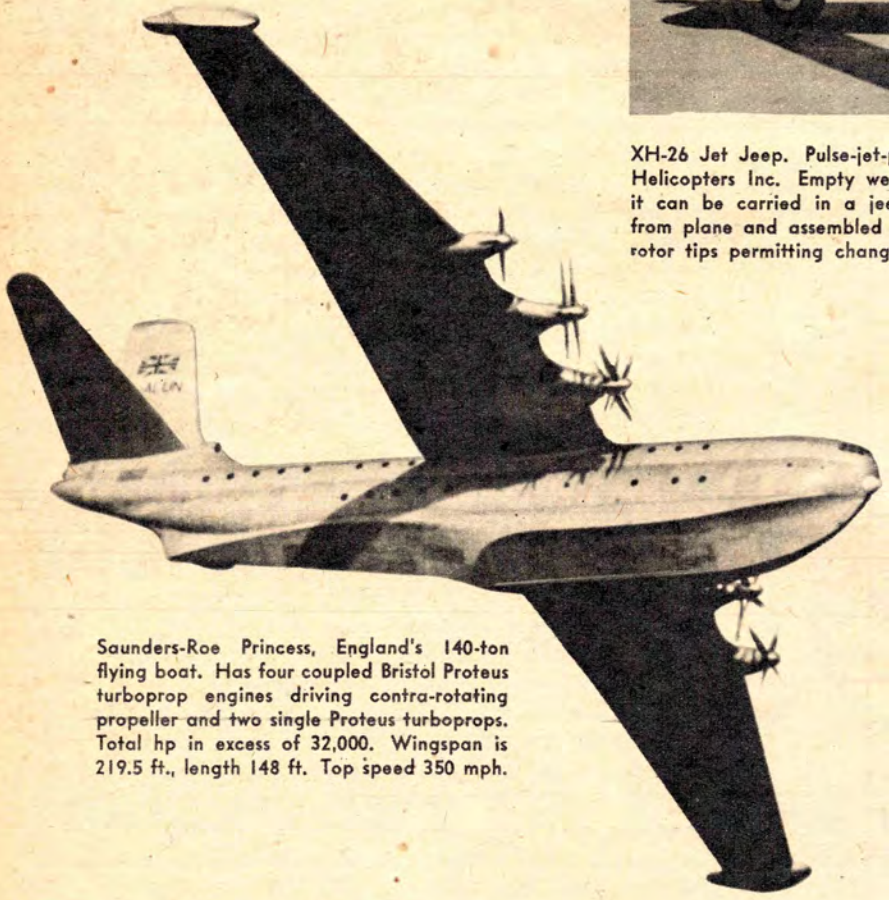
Then the thud of running feet coming his way. It is Russ, to tell him they are using hand grenades as a last resort to get the MiG apart. Now they will really have to work fast, for the noise of the grenades will advertise their presence to the whole valley and beyond. . . . The wrecking crew heaves into view, carrying, dragging and shoving bits and sections of the MiG. They dash back for more, and when finally the last man has wormed his way into the H-19 atop the pile of MiG pieces, there is little of the Red plane left behind. It has taken 45 minutes instead of the planned ten.

Captain Cooper revs his Pratt & Whitney engine and gently engages the rotor clutch. With the additional extra weight of the MiG in its belly, the H-19 shudders and heaves—but slowly they are airborne. Now, can they get out of the clearing? "I (*Continued on page* 58)

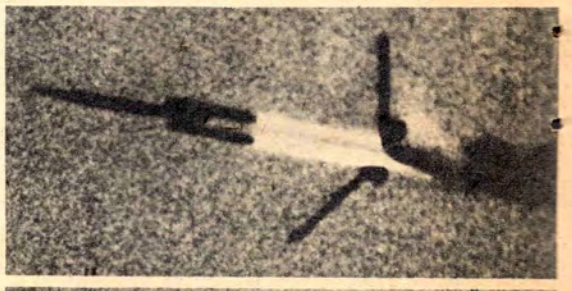
The World A-Wing

Ryan Q-2 pilotless target drone. Silhouette drawing released by Department of Defense gives only general view of craft as it is still on secret list. However, it does reveal that power is a small turbojet engine. Size is half that of military jet fighter, comparable speed.

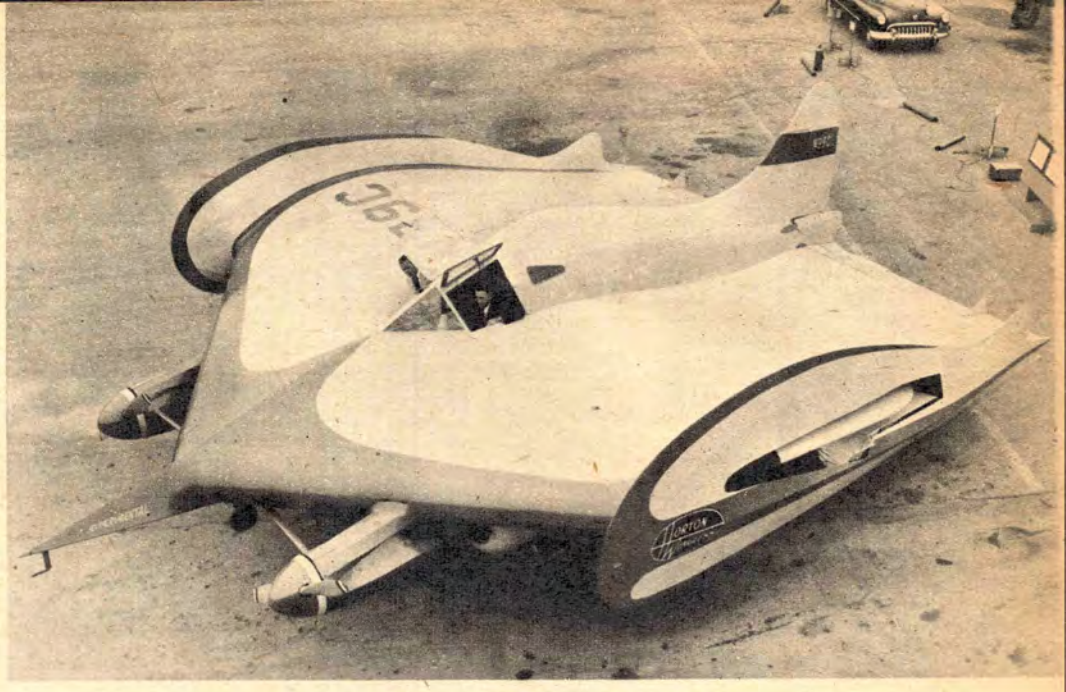
XH-26 Jet Jeep. Pulse-jet-powered helicopter built for the Army by American Helicopters Inc. Empty weight 300 lbs., but can lift twice this. Disassembled it can be carried in a jeep or packed into 5x5x14 ft. container parachuted from plane and assembled by two men in 20 minutes. Engines swivel freely at rotor tips permitting change of blade pitch without altering angle of engines.



Saunders-Roe Princess, England's 140-ton flying boat. Has four coupled Bristol Proteus turboprop engines driving contra-rotating propeller and two single Proteus turboprops. Total hp in excess of 32,000. Wingspan is 219.5 ft., length 148 ft. Top speed 350 mph.



Long Way From the Wrights

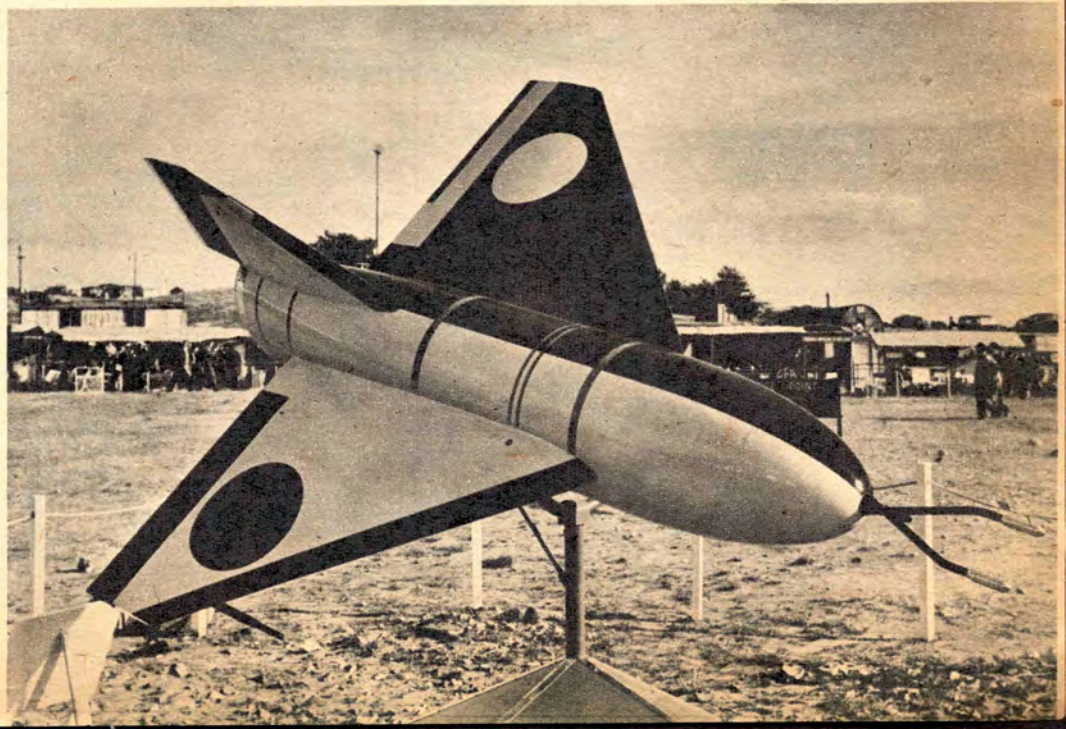


Horton Wingless plane. Second type designed by Wm. Horton of Santa Ana, Calif. Original appeared in June 1951 "AT." Recently made a test hop. Secret of performance is the tip plates which effectively keep high-pressure region from penetrating into the low-pressure one. This sealing off increases the effective aspect ratio of wing. Length 40 ft.

Left: Britain's twin-engine, twin-rotor helicopter, the Bristol 173. Powered by two Alvis Leonides engines developing 550 hp each. Presently holds 13 passengers, will carry 17 when in production. To be used on short-range air services. Rotor diameter is 48 ft. 7 in., fuselage length 78 ft. 2 in. Engines are so coupled through clutch that in event of failure either can drive both rotors. Maximum speed is 140 mph.

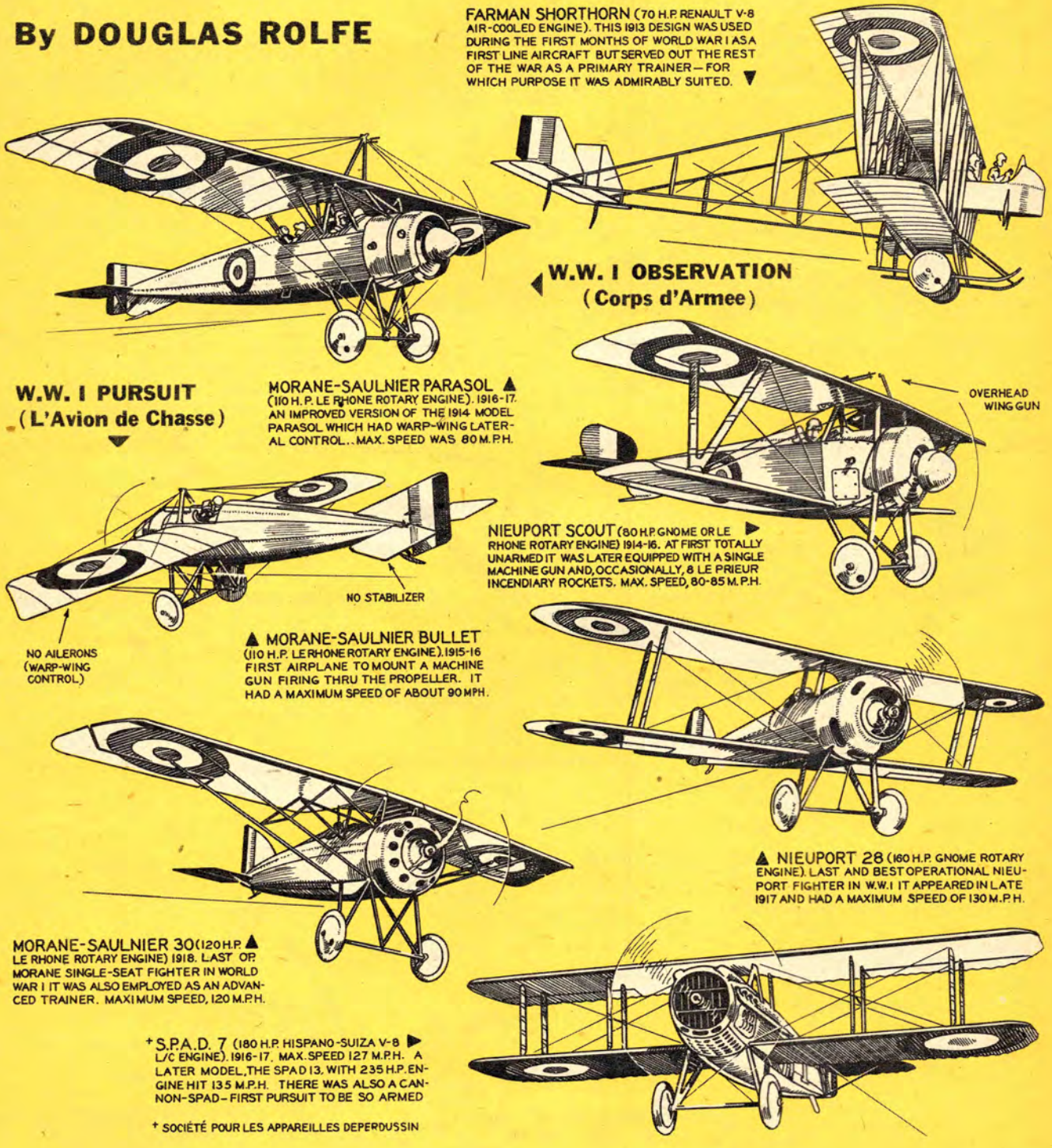
Right: Fairey delta guided missile, first shown at recent Farnborough show. Powered by a 2500 lb. thrust Beta II rocket motor. Has been test-flown at the Woomera test station in Australia. Although fully equipped with same type of guidance as radio-controlled missiles, it is undoubtedly slated for aerodynamic research of delta wing, as power output of rocket engine is too low for speed requirements of airborne weapons.

Left: British research guided missile developed by the Bristol Aeroplane Co., powered by ramjet engine and booster rockets. Top photo shows the missile at start of flight with rockets still attached. At center, rockets slide away as missile reaches speed of sound. Bottom, the missile is now free of rockets, flying on the power of its two ramjets. The rockets are used primarily to bring the missile up to speed at which its own engine becomes effective.



L'Armée de l'Air Francaise: 1914-1926

By DOUGLAS ROLFE

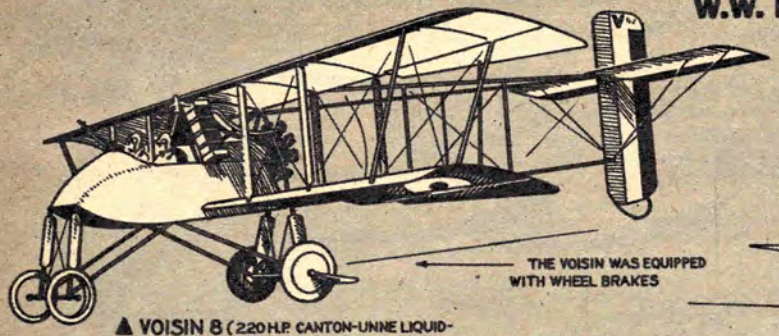

FARMAN SHORTHORN (70 H.P. RENAULT V-8 AIR-COOLED ENGINE). THIS 1913 DESIGN WAS USED DURING THE FIRST MONTHS OF WORLD WAR I AS A FIRST LINE AIRCRAFT BUT SERVED OUT THE REST OF THE WAR AS A PRIMARY TRAINER—FOR WHICH PURPOSE IT WAS ADMIRABLY SUITED.
W.W. I OBSERVATION (Corps d'Armee)
W.W. I PURSUIT (L'Avion de Chasse)
MORANE-SAULNIER PARASOL (110 H.P. LE RHONE ROTARY ENGINE). 1916-17. AN IMPROVED VERSION OF THE 1914 MODEL PARASOL WHICH HAD WARP-WING LATERAL CONTROL. MAX. SPEED WAS 80 M.P.H.
OVERHEAD WING GUN
NIEUPORT SCOUT (80 H.P. GNOME OR LE RHONE ROTARY ENGINE) 1914-16. AT FIRST TOTALLY UNARMED IT WAS LATER EQUIPPED WITH A SINGLE MACHINE GUN AND, OCCASIONALLY, 8 LE PRIEUR INCENDIARY ROCKETS. MAX. SPEED, 80-85 M.P.H.
NO STABILIZER
NO AILERONS (WARP-WING CONTROL)
MORANE-SAULNIER BULLET (110 H.P. LE RHONE ROTARY ENGINE). 1915-16 FIRST AIRPLANE TO MOUNT A MACHINE GUN FIRING THRU THE PROPELLER. IT HAD A MAXIMUM SPEED OF ABOUT 90 MPH.
NIEUPORT 28 (160 H.P. GNOME ROTARY ENGINE). LAST AND BEST OPERATIONAL NIEUPORT FIGHTER IN W.W.I IT APPEARED IN LATE 1917 AND HAD A MAXIMUM SPEED OF 130 M.P.H.
MORANE-SAULNIER 30 (120 H.P. LE RHONE ROTARY ENGINE) 1918. LAST OF MORANE SINGLE-SEAT FIGHTER IN WORLD WAR I IT WAS ALSO EMPLOYED AS AN ADVANCED TRAINER. MAXIMUM SPEED, 120 M.P.H.
+S.P.A.D. 7 (180 H.P. HISPANO-SUIZA V-8 L/C ENGINE). 1916-17. MAX. SPEED 127 M.P.H. A LATER MODEL, THE SPAD 13, WITH 235 H.P. ENGINE HIT 135 M.P.H. THERE WAS ALSO A CANNON-SPAD—FIRST PURSUIT TO BE SO ARMED
+ SOCIÉTÉ POUR LES APPAREILLES DEPERDUSSIN

France was the first country in the world to adopt the air arm, and at the outbreak of World War I was the dominant air power with 1,200 trained pilots and over 1,000 serviceable planes. True, many of these planes were obsolete or at least obsolescent, but at that time nobody had the faintest idea of just what place aviation would assume in the military picture.

In the early days of this war armament was limited if it existed at all, and anti-aircraft weapons were few and comparatively harmless. Thus it was possible to utilize planes with a top speed of something very much under 60 mph and ceilings of about 5,000 without much damage being done to anyone.

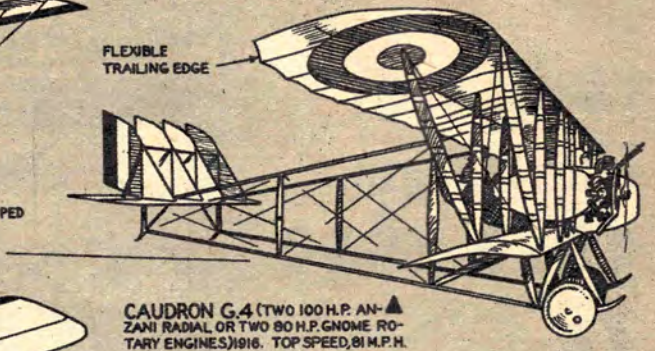
The French air arm pioneered in many features common to modern military aerial warfare. They were first to use the single-seat fighter; first to

W.W. I BOMBER-FIGHTERS (Bombardment)



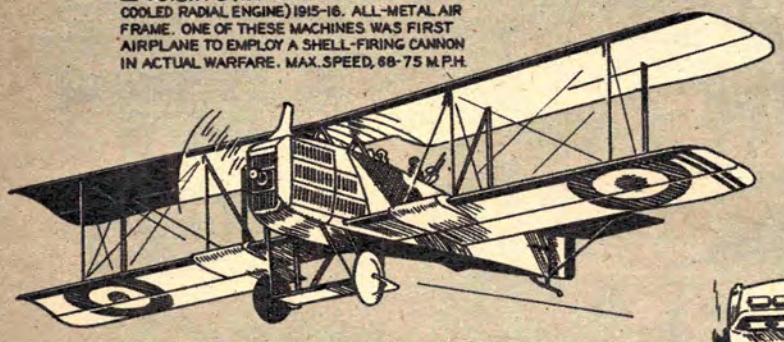
▲ VOISIN 8 (220 H.P. CANTON-UNNE LIQUID-COOLED RADIAL ENGINE) 1915-16. ALL-METAL AIR FRAME. ONE OF THESE MACHINES WAS FIRST AIRPLANE TO EMPLOY A SHELL-FIRING CANNON IN ACTUAL WARFARE. MAX. SPEED, 68-75 M.P.H.

THE VOISIN WAS EQUIPPED WITH WHEEL BRAKES

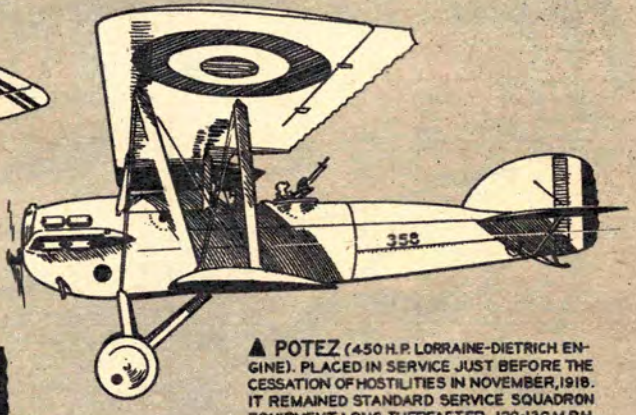


FLEXIBLE TRAILING EDGE

CAUDRON G.4 (TWO 100 H.P. ANZANI RADIAL OR TWO 80 H.P. GNOME ROTARY ENGINES) 1916. TOP SPEED, 81 M.P.H. ▲

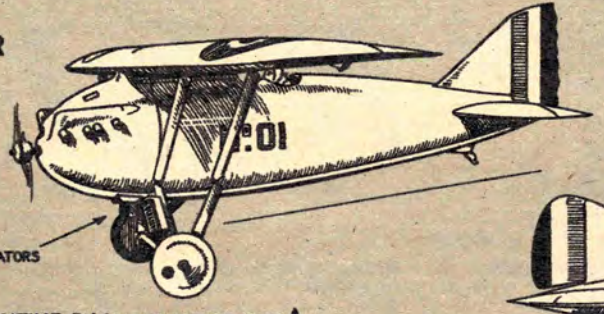


BREGUET 14 (310 H.P. L/C RENAULT ENGINE) 1918. ALL-METAL AIRFRAME AND WING FLAPS PLACED THIS AIRPLANE FAR AHEAD OF MOST CONTEMPORARY DESIGNS. — 112 M.P.H. ▲



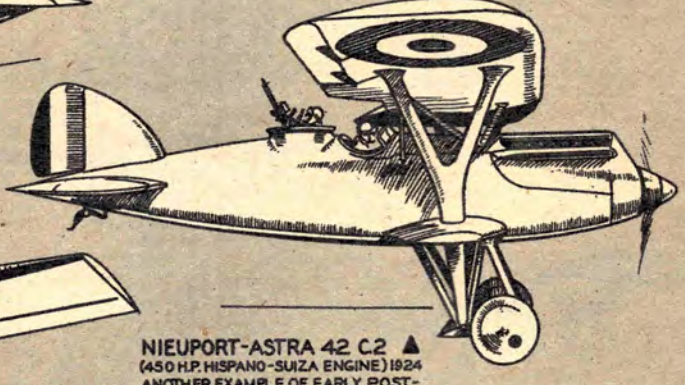
▲ POTEZ (450 H.P. LORRAINE-DIETRICH ENGINE). PLACED IN SERVICE JUST BEFORE THE CESSATION OF HOSTILITIES IN NOVEMBER, 1918. IT REMAINED STANDARD SERVICE SQUADRON EQUIPMENT LONG THEREAFTER. 120-130 M.P.H.

POSTWAR MODELS



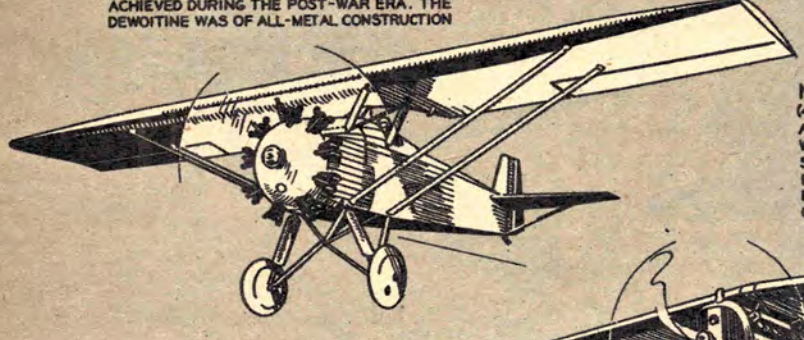
LEG RADIATORS

DEWOITINE D.1 (300 H.P. HISPANO-SUIZA ENGINE) 1924. THIS 153 M.P.H. FIGHTER ILLUSTRATES THE RAPID STRIDES IN AIR PROGRESS ACHIEVED DURING THE POST-WAR ERA. THE DEWOITINE WAS OF ALL-METAL CONSTRUCTION ▲

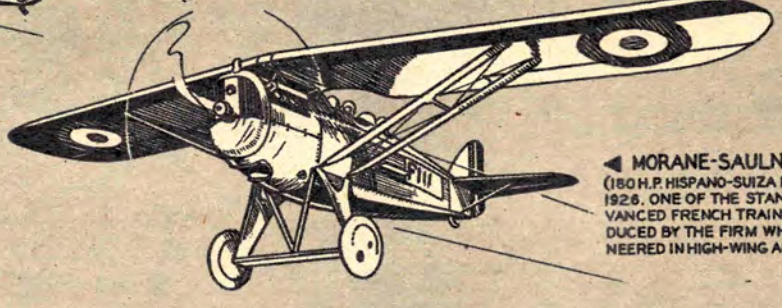


NIEUPORT-ASTRA 42 C2 (450 H.P. HISPANO-SUIZA ENGINE) 1924 ANOTHER EXAMPLE OF EARLY POST-WAR DESIGN. THERE EXISTED ALSO A SINGLE-SEAT VERSION OF THIS AIRPLANE. THE CHARACTERISTIC RUDIMENTARY LOWER WING APPEARED ON NIEUPORT PLANES FIRST IN 1914. ▲

DOUGLAS ROLFE



WIBAULT 7 (450 H.P. BRISTOL JUPITER RADIAL ENGINE) 1926. THIS ALL-METAL SINGLE-SEAT FIGHTER WAS PRECURSOR OF A LONG SERIES OF WIBAULT MILITARY PLANES ▲

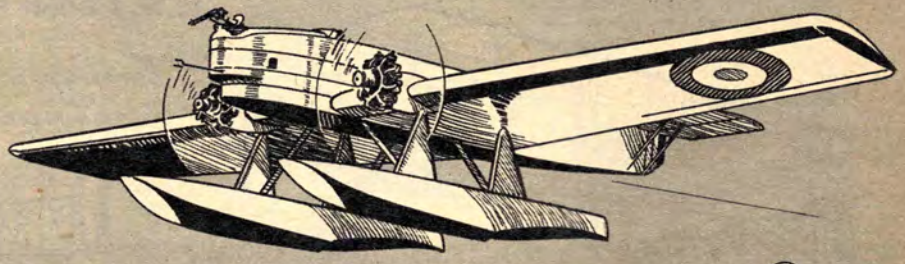


◀ MORANE-SAULNIER 129 (180 H.P. HISPANO-SUIZA ENGINE) 1926. ONE OF THE STANDARD ADVANCED FRENCH TRAINERS PRODUCED BY THE FIRM WHICH PIONEERED IN HIGH-WING AIRPLANES

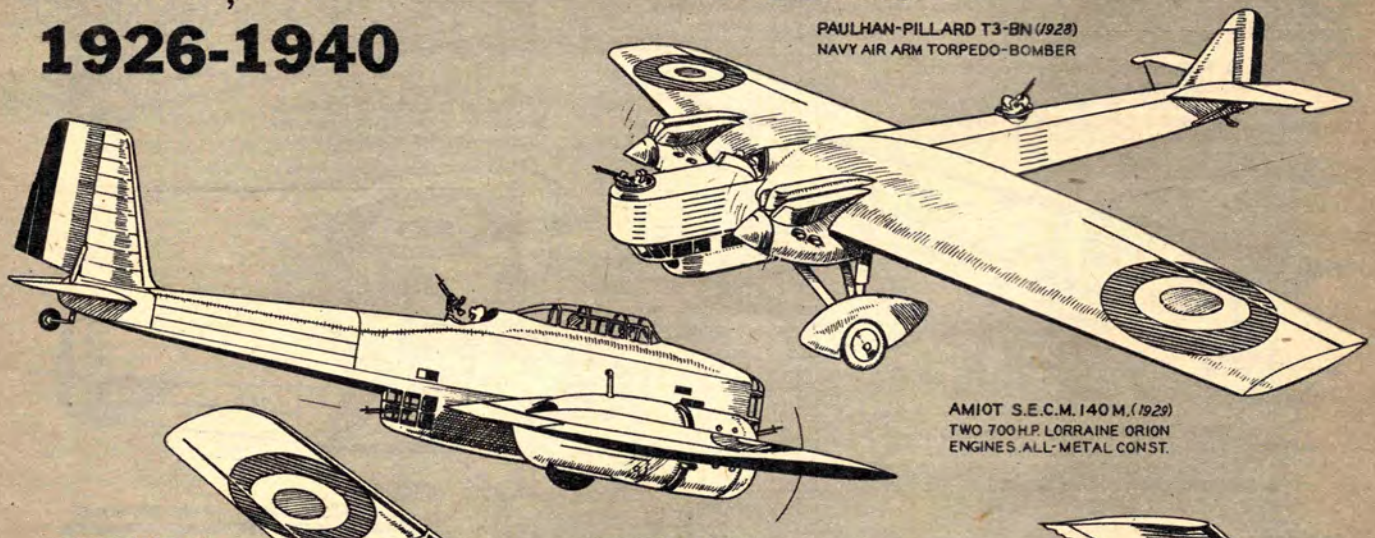
employ electrically fired rockets and first to mount cannon on both multi- and single-place fighters. Despite a somewhat romantic approach to the business of aerial warfare and an incredibly sloppy ground maintenance, the French Air Corps consistently turned out pilots and airmen of great bravery and skill. Garros, Pegoud, Guneymer and Fonck are names which will long be recalled in talk of the relative merits of fighter pilots.

From the point of actual air progress the planes illustrated here have many interesting angles. The ones on these two pages represent only a very few of the numerous types France employed during the first World War. On the following two pages we cover the second period of the French Air Corps ending with the brief and disastrous part it played in World War II.

L'Armée de l'Air Française 1926-1940

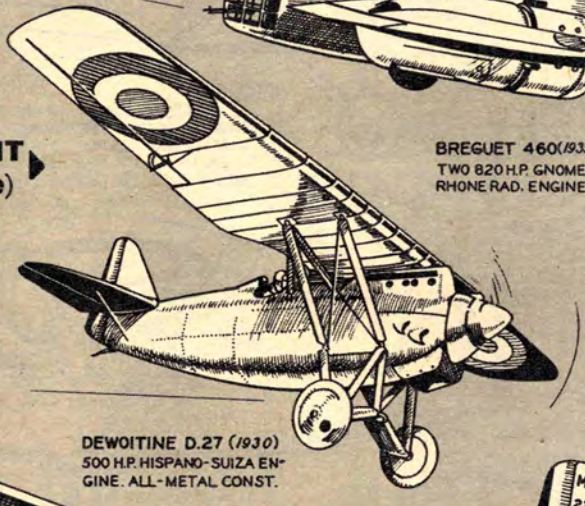


PAULHAN-PILLARD T3-BN (1928)
NAVY AIR ARM TORPEDO-BOMBER

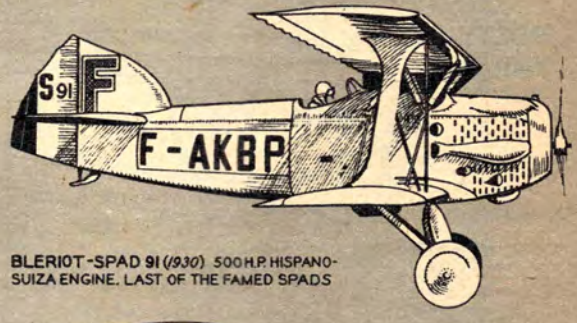


AMIOT S.E.C.M. 140 M. (1929)
TWO 700 H.P. LORRAINE ORION ENGINES. ALL-METAL CONST.

PURSUIT (Chasse)

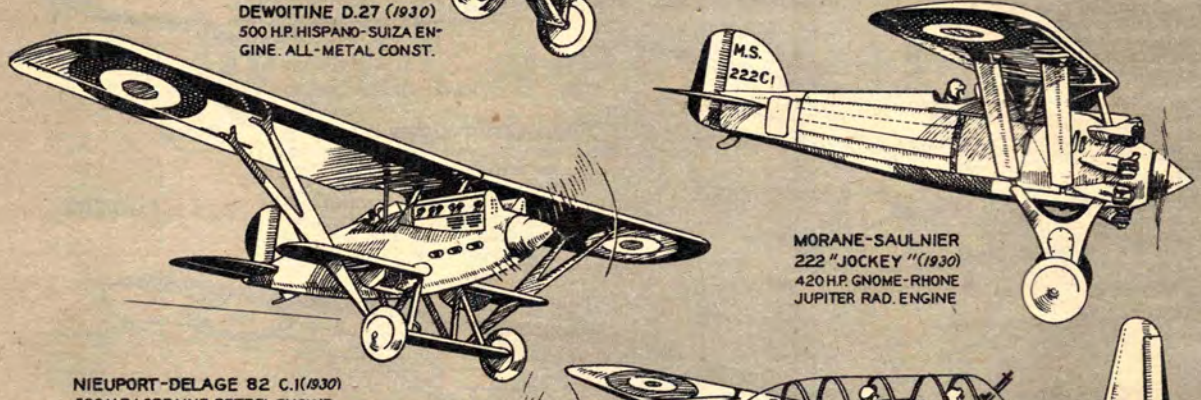


BREGUET 460 (1935)
TWO 820 H.P. GNOME-RHONE RAD. ENGINES



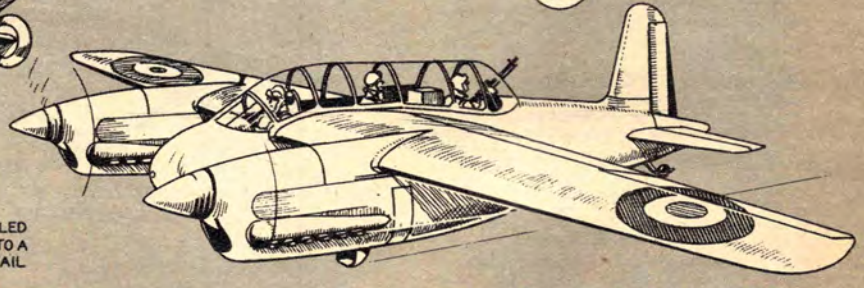
BLERIOT-SPAD 91 (1930) 500 H.P. HISPANO-SUIZA ENGINE. LAST OF THE FAMED SPADS

DEWOITINE D.27 (1930)
500 H.P. HISPANO-SUIZA ENGINE. ALL-METAL CONST.



MORANE-SAULNIER 222 "JOCKEY" (1930)
420 H.P. GNOME-RHONE JUPITER RAD. ENGINE

NIEUPORT-DELAGE 82 C.1 (1930)
500 H.P. LORRAINE PETREL ENGINE

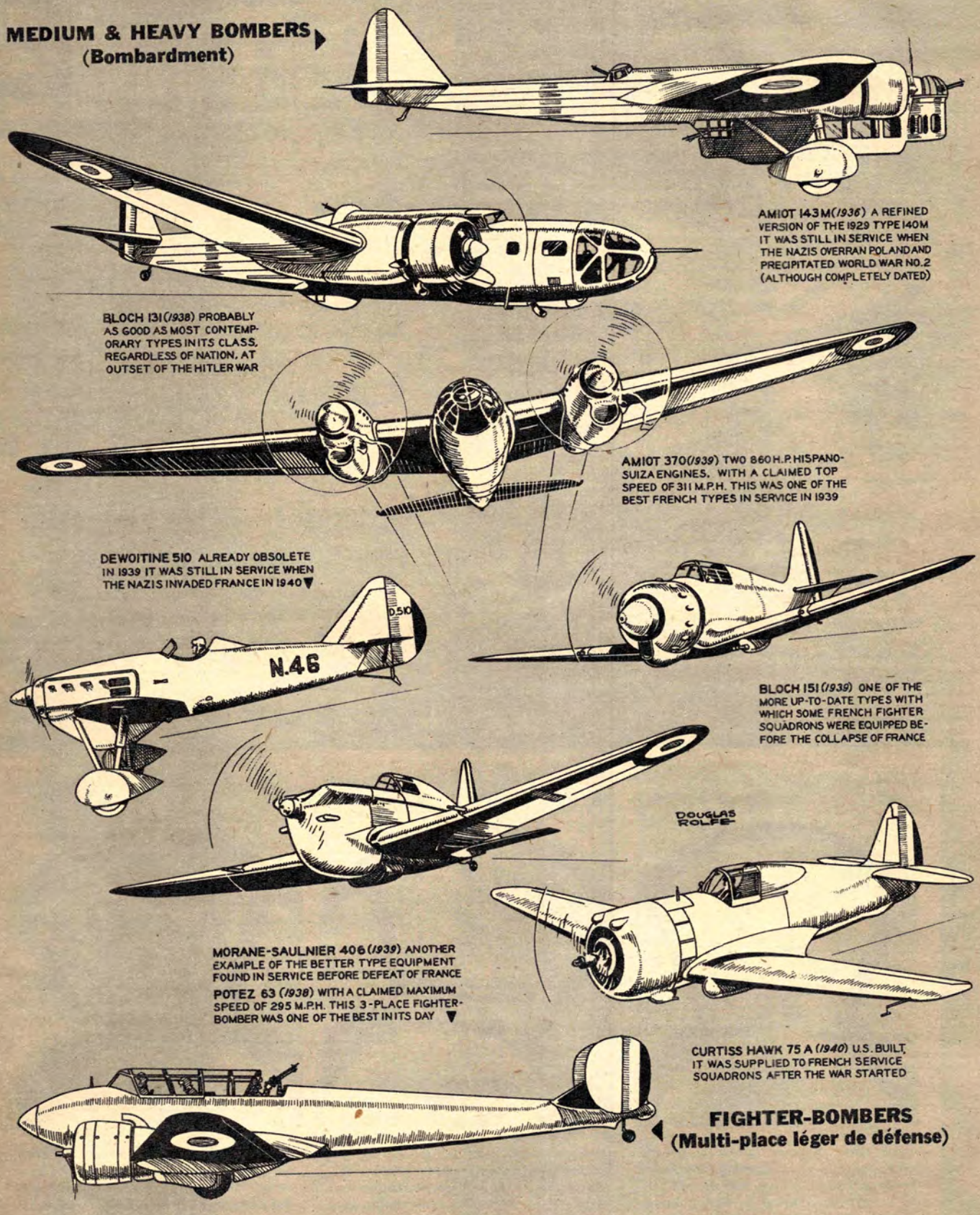


HANRIOT (1936) TWO 450 H.P. INVERTED AIR-COOLED RENAULT V-12 ENGINES. AN EARLY APPROACH TO A FAMILIAR WORLD WAR 2 TYPE. NOTE TOO-SMALL TAIL

For some years after World War I the French maintained a formidable air arm equipped with some of the best military aircraft in the world. At this period French design was quite advanced. In fact, at a time when we were still largely dependent on fabric-covered military planes the French were producing all-metal types of very interesting and often advanced design.

As World War II loomed closer and closer the situation was less favorable. The French were burdened with a preponderance of prototype designs and heavily involved in labor troubles within the aircraft industry, so that when the war actually broke out in 1939 they found themselves with more than the usual number of outdated aircraft in their first-line squadrons.

Lacking any fighters comparable to the Hurricane and the Spitfire with which the British managed later to blunt the overwhelming numerical superiority of the Luftwaffe, the French air arm was rapidly reduced to a state


MEDIUM & HEAVY BOMBERS
(Bombardment)
AMIOT 143M (1936) A REFINED VERSION OF THE 1929 TYPE 140M IT WAS STILL IN SERVICE WHEN THE NAZIS OVERRAN POLAND AND PRECIPITATED WORLD WAR NO. 2 (ALTHOUGH COMPLETELY DATED)
BLOCH 131 (1938) PROBABLY AS GOOD AS MOST CONTEMPORARY TYPES IN ITS CLASS, REGARDLESS OF NATION, AT OUTSET OF THE HITLER WAR
AMIOT 370 (1939) TWO 860 H.P. HISPANO-SUIZA ENGINES, WITH A CLAIMED TOP SPEED OF 311 M.P.H. THIS WAS ONE OF THE BEST FRENCH TYPES IN SERVICE IN 1939
DEWOITINE 510 ALREADY OBSOLETE IN 1939 IT WAS STILL IN SERVICE WHEN THE NAZIS INVADED FRANCE IN 1940
D.510
N.46
BLOCH 151 (1939) ONE OF THE MORE UP-TO-DATE TYPES WITH WHICH SOME FRENCH FIGHTER SQUADRONS WERE EQUIPPED BEFORE THE COLLAPSE OF FRANCE
DOUGLAS ROLFE
MORANE-SAULNIER 406 (1939) ANOTHER EXAMPLE OF THE BETTER TYPE EQUIPMENT FOUND IN SERVICE BEFORE DEFEAT OF FRANCE
POTEZ 63 (1938) WITH A CLAIMED MAXIMUM SPEED OF 295 M.P.H. THIS 3-PLACE FIGHTER-BOMBER WAS ONE OF THE BEST IN ITS DAY
CURTISS HAWK 75 A (1940) U.S. BUILT, IT WAS SUPPLIED TO FRENCH SERVICE SQUADRONS AFTER THE WAR STARTED
FIGHTER-BOMBERS
(Multi-place léger de défense)

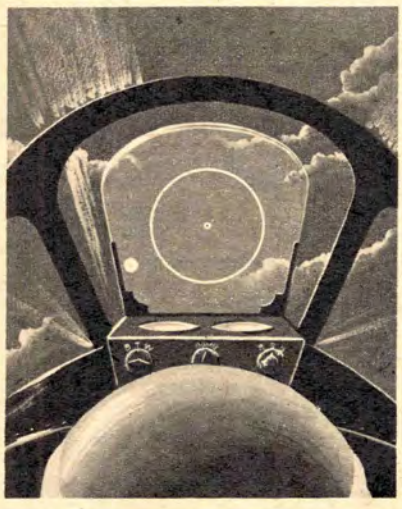
of impotency. Worse still, in the tragic 40 days which ended in the fall of France the Nazis were able to, and did attack the major French air bases far behind the battle line. After a brief aerial bombardment paratroops shot up the bewildered field personnel, and then the more serviceable French aircraft were flown away by German pilots brought in by air for this special purpose, while the captured French pilots were taken off to captivity in Luftwaffe transports.

In these dire straits the French made a futile appeal to the British for more fighter squadrons. The British, seeing the imminent fall of France, wisely refrained from committing their reserve fighter command to what was indeed a hopeless cause.

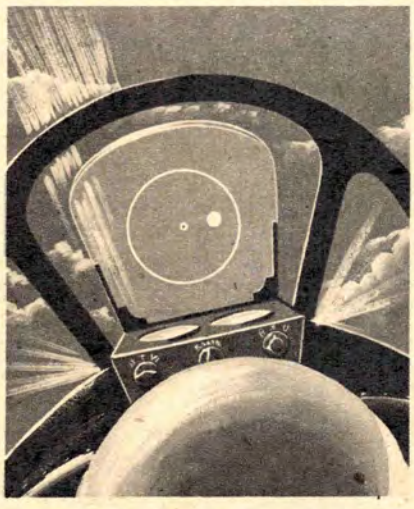
During World War II the French received from the U. S. a number of Curtiss Hawk 75A's (export version of the P-36), Vought SB2U Chesapeakes, Douglas DB-7's and Martin Maryland twin-engine bombers.

An electronic brain reacting with the speed of light helps to destroy the enemy in aerial combat fought at the speed of sound

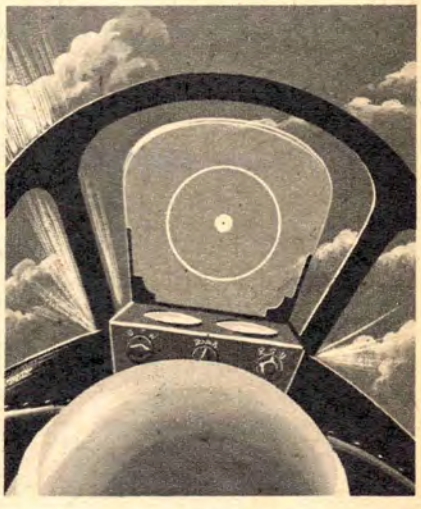
NO TIME



These three sketches furnish a graphic pilot's-eye view of A-1 sight in action. Radar image of target is low and to the left. Pilot must line up fighter in order to center radar pip in gunsight reticle. Radar measures enemy's distance, your range. Range circuit "locks onto" target, and servo supplies this range data to sight's computer.



As fighter banks to the left in a diving turn to center image, two gyros tilt a mirror device in the sight head. When pilot corrects for mirror tilt by turning to center radar pip, computer automatically supplies proper deflection lead. Note how pip glows brighter as plane comes within shooting range at about 2000 yds.



Pilot goes into a gentle right turn to correct for target's evasive action. Pip is now centered. Plane is in range and on target. Bull's-eye! (Note switches on the sight head: Left reads BTW, means Bomb-Target-Wind scale. Center is weapons selector switch, changes sight's function, from m.g.'s & rockets to bombs. Right, RSU: rocket setting unit.)

TO KILL!

By JAMES L. H. PECK

■ "If any one factor accounts for our combat score against the MiG-15, it is the radar gunsight," said an FEAF armament officer, recently. And a pilot from the 27th Fighter-Escort Wing—the first operational unit to use the A-1 sight in combat—was equally emphatic: "Our outfit and other fighter-bomber units have been making some remarkable hits with rockets and bombs as well as our gun armament. The sight has more to do with this than any single factor, including skill or luck."

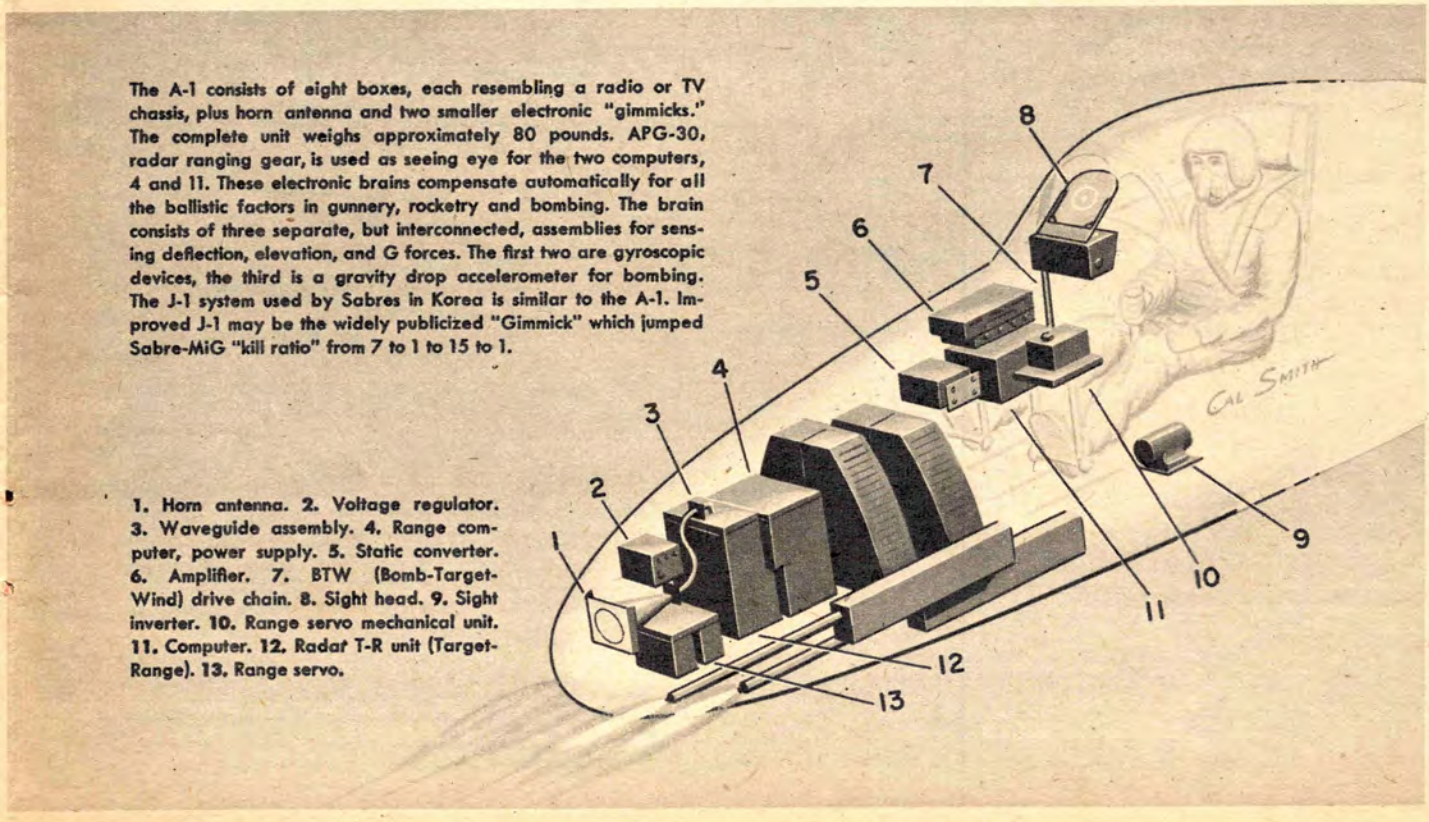
In aerial combat that borders on the supersonic, Sabre and Thunderjet pilots have to be as quick on the draw as a Western gunfighter. At the other extreme down below, the fighter-bomber boys who work over Red ground targets at tree-top altitude cannot invite flak hits by hesitating to figure out windage, drift, slant range and other bombing or rocketry "kinematics."

This amazing electronic computing sight solves all such problems for the jet men who haven't time to kill. The A-1 sight does practically everything but fly the airplane. It accomplishes even that, in the newest A-1C version, through a hook-up with the fighter's autopilot. In normal use with the present model, however, all the pilot need do is center target image in his sight, fire.

Airmen are getting hits at fantastic ranges. They've scored hits and even a few kills over Korea at 2,000 yards—about one and one-eighth miles. The maximum range of most World War II kills was 650 yards; and the boys are now flying almost twice as fast as they did against the Luftwaffe and Jap Air Force. Moreover, by detecting enemy aircraft at night, under daytime conditions of poor visibility, or at extreme ranges beyond human vision even when the sky is clear, the A-1 and J-1 sighting system provide the single-seater fighter with the all-weather capabilities of the slower, more costly two-seater night fighter.

The basic design of the radar sight is credited to Dr. Charles S. Draper, head of M.I.T.'s department of aeronautical engineering, and probably the world's leading designer of automatic angular tracking devices. Production of the sight—with its all-important APG-30 radar—was turned over to the Sperry Gyroscope Company. The Republic Thunderjet was selected for the first service-test trials, and the F-84E-25 series was the first production-line aircraft to be fitted with the sight.

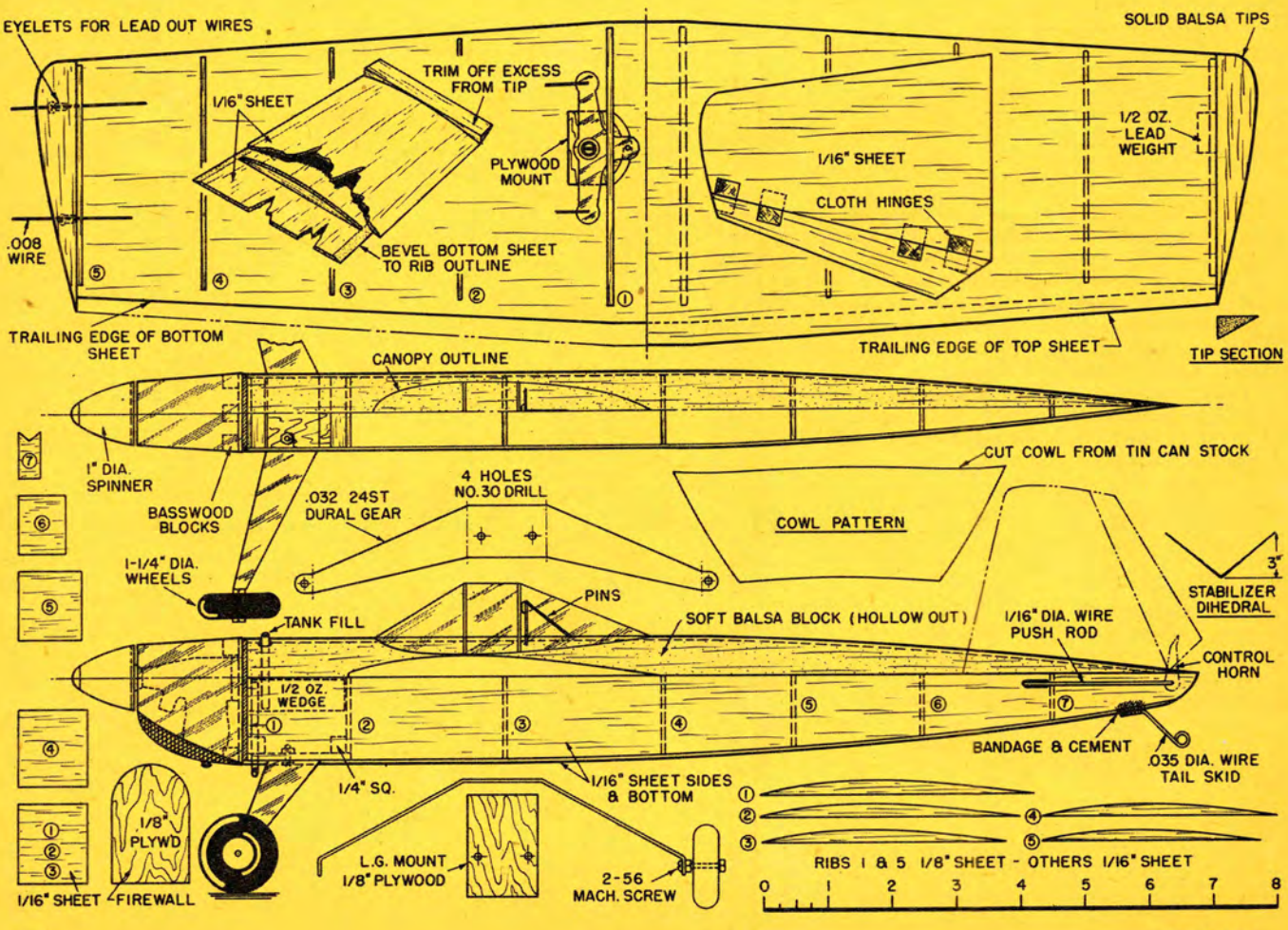
A sufficient number of Thunderjets and Sabres have been lost, meanwhile, through operational accidents or combat to make it almost a certainty that both radar sights have been thoroughly compromised. The Reds are presumed to have salvaged enough of the pieces from enough different airplanes to have gained a working knowledge of the equipment. But one officer commented, "It will still take them more than two years to build a duplicate that will work, notwithstanding the fact the Reds already have a fairly good radar sight."



The A-1 consists of eight boxes, each resembling a radio or TV chassis, plus horn antenna and two smaller electronic "gimmicks." The complete unit weighs approximately 80 pounds. APG-30, radar ranging gear, is used as seeing eye for the two computers, 4 and 11. These electronic brains compensate automatically for all the ballistic factors in gunnery, rocketry and bombing. The brain consists of three separate, but interconnected, assemblies for sensing deflection, elevation, and G forces. The first two are gyroscopic devices, the third is a gravity drop accelerometer for bombing. The J-1 system used by Sabres in Korea is similar to the A-1. Improved J-1 may be the widely publicized "Gimmick" which jumped Sabre-MiG "kill ratio" from 7 to 1 to 15 to 1.

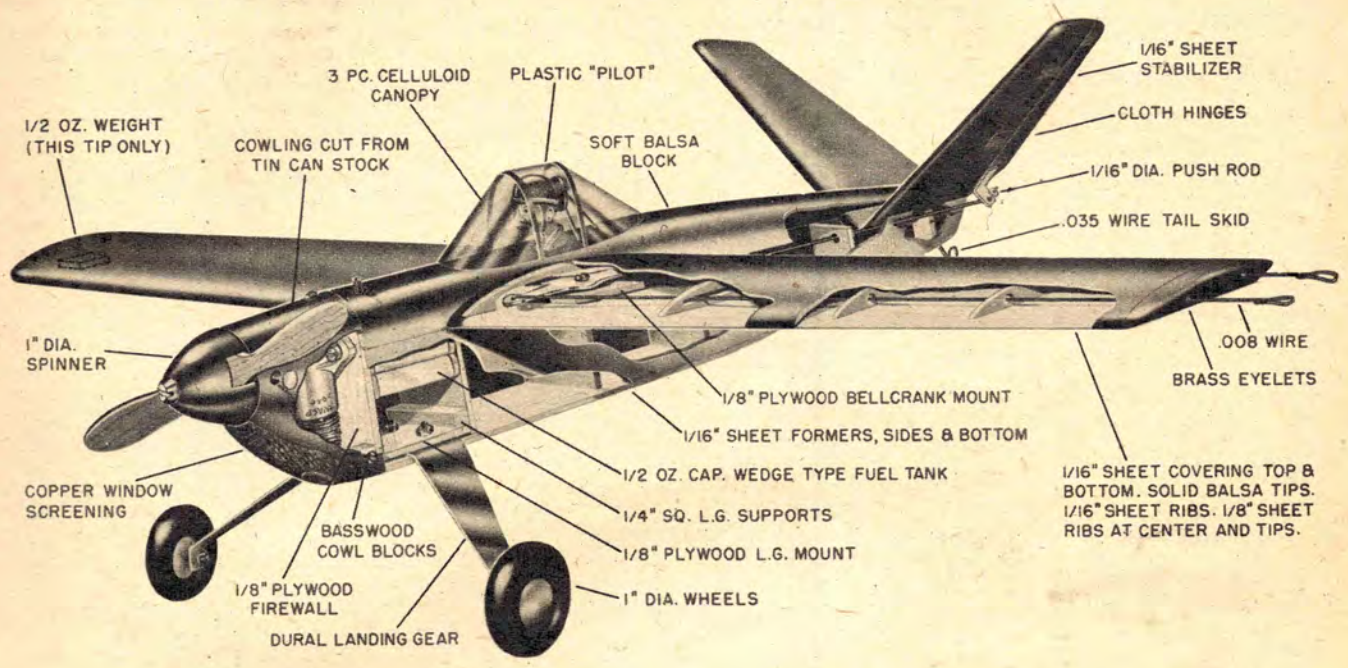
1. Horn antenna. 2. Voltage regulator. 3. Waveguide assembly. 4. Range computer, power supply. 5. Static converter. 6. Amplifier. 7. BTW (Bomb-Target-Wind) drive chain. 8. Sight head. 9. Sight inverter. 10. Range servo mechanical unit. 11. Computer. 12. Radar T-R unit (Target-Range). 13. Range servo.

Half-Pep Racer



Just in time for the indoor team race competitions is this Wasp powered Half-A semi-scale V-tailed job

By TED GRZESZCZAK


1/16" SHEET STABILIZER
3 PC. CELLULOID CANOPY
PLASTIC "PILOT"
CLOTH HINGES
1/2 OZ. WEIGHT (THIS TIP ONLY)
COWLING CUT FROM TIN CAN STOCK
SOFT BALSA BLOCK
1/16" DIA. PUSH ROD
.035 WIRE TAIL SKID
1" DIA. SPINNER
.008 WIRE
BRASS EYELETS
1/8" PLYWOOD BELLCRANK MOUNT
1/16" SHEET FORMERS, SIDES & BOTTOM
1/2 OZ. CAP. WEDGE TYPE FUEL TANK
1/16" SHEET COVERING TOP & BOTTOM. SOLID BALSA TIPS. 1/16" SHEET RIBS. 1/8" SHEET RIBS AT CENTER AND TIPS.
COPPER WINDOW SCREENING
1/4" SQ. L.G. SUPPORTS
BASSWOOD COWL BLOCKS
1/8" PLYWOOD L.G. MOUNT
1/8" PLYWOOD FIREWALL
1" DIA. WHEELS
DURAL LANDING GEAR

■ Team racing can now be enjoyed by anyone possessing a Half-A engine. Mini-team racing competition can be flown indoors on short lines in a small place. A gym or a small hall serves well for night gathering.

Experiments can be carried out with various fuel mixtures to obtain maximum rpm's. A record should be kept also of the various fuels for duration. Then a cross-check can be made for the hottest fuel with the greatest duration.

Experiments can be conducted with various props in respect to diameter/pitch relationship for maximum thrust and rpm's. To find which prop gives the most thrust, tie a piece of ¼" flat rubber to the tail skid of a model and secure the other end to a fixed point. After each individual prop test, measure the distance that the model moved forward. This is a sure method of showing comparable efficiency. Here again a record should be kept to see which prop proved most efficient in duration and power output.

The propeller and fuel mixture selection will give you the best economical operating combination. If these tests are carried out after a club meeting, attendance is sure to boom.

After all this top secret information is compiled and your speed merchants have several hot Half-A's, a challenge can be sent to other clubs and, unless they have made similar tests they will be far behind when the checkered flag comes down. This information will prove valuable when competing for hardware.

Using a Half-A engine, the noise factor is lessened. Economy, using Half-A engines, cannot be overlooked. Half-A team racers can be built quicker and require less space for construction than larger ones. The size of a model does not decide the amount of hardware it can win.

The main theme in this design was to produce a model of minimum size and weight conforming to the rules which state: "½ ounce fluid tank with maximum engine displacement of (.05) cubic inches and minimum wing area 75 sq. in. Along with a minimum cockpit cross section of 1¼"x1½", no engine cut-off is required."

A realistic cowling, fixed gear, and dummy pilot, give the model the required scale effect to make it eligible for team racing competition. Your speed runs can be checked 8 laps per ¼ mile, 16 per half and so on. These figures are computed against 26 ft. 3 in. line lengths. The engine was inverted to produce the shortest possible gear. The wing and stabilizer were located along the thrust line to produce good power on and off flight stability.

Using a V type stabilizer gives added protection when taking off and landing in rough areas. Only one elevator is required for this team racer. A moderate thick flat bottom wing section affords ample room for the bellcrank and gives ease in construction. The sharp leading and trailing edges reduce possible drag to a very minimum.

Sheet balsa construction for the wing gives a light, strong, durable structure. Sheet balsa sides are employed along with a soft balsa block for the fuselage.

A fixed gear cut from (.032 24ST) aluminum serves well.

Cut the cowling from tin can stock, using copper window screening for the compound curve and venting. This copper screen can be bulged to fit the engine to be used. A streamline canopy can be used if obtainable. However, one can be made from sheet celluloid as shown on the plans. The dummy pilot can be purchased at the hobby shop.

Since our Half-A team racer is rather on the light (*Continued on page* 58)

Houn' Dog

A real sad-looking character, but designed for rough work in the field trials, this club training plane is a glutton for punishment

By JACK MACY

CERTIFICATION of HOUN' DOG

This is to certify that I have made four flights with a standard Houn' Dog powered by a K&B .29, and executed the following maneuvers: vertical climbs and dives, inside and outside loops, inverted inside and outside loops, sustained inverted flight, horizontal and vertical eights. I am so enthusiastic about this airplane's maneuverability, as well as its extreme ease of construction and maintenance, that I intend to build one myself

Charles C. Martin
Noted New England Stunt Pilot

■ A couple of years ago we had a brand-new stunter. We decked it out with a cream and red dope job, and it looked very pretty. It handled so sweetly the first few flights that we felt confident we could fly inverted as well as the next fellow. Of course the results weren't too disastrous. The engine wasn't hurt at all, and we salvaged the bellcrank, wheels, tank, and control horns before burning the assorted small pieces of balsa and paper.

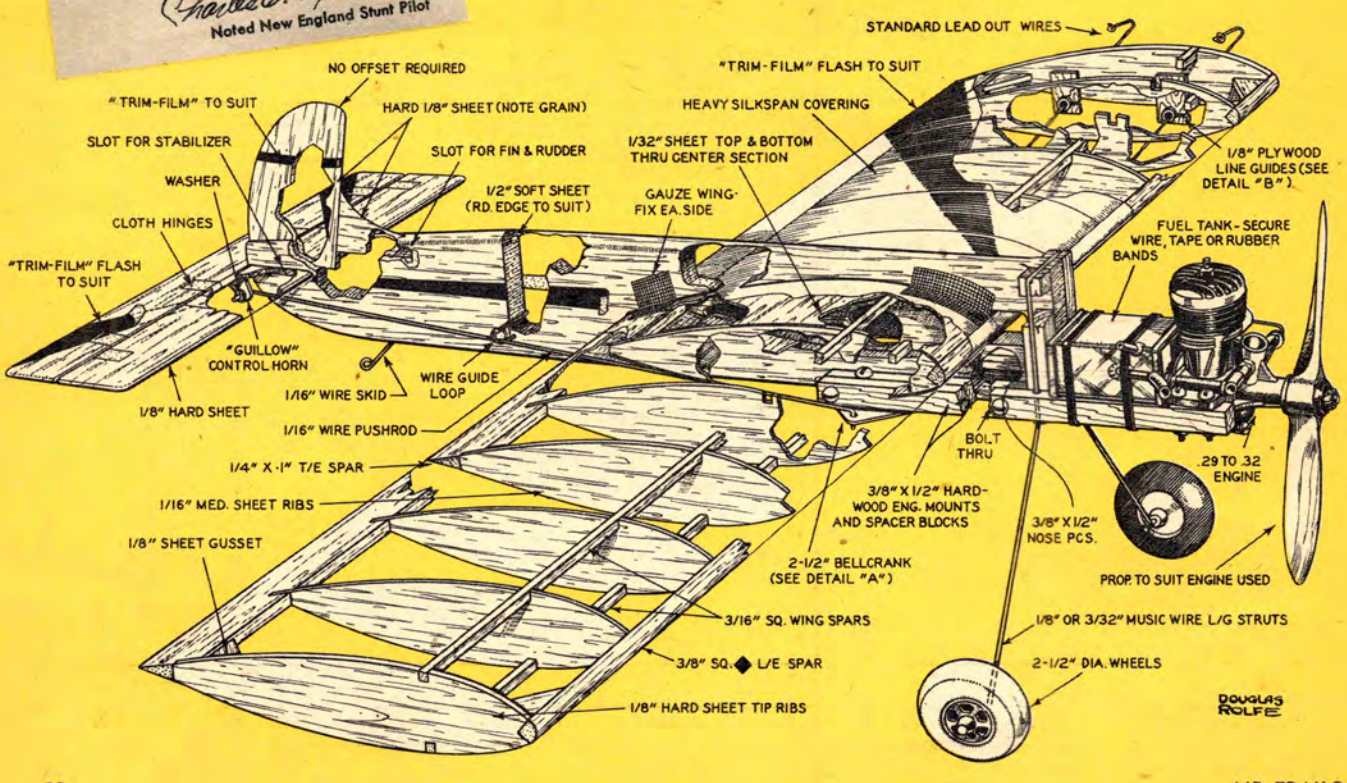
After several similar episodes, we came to the conclusion that it would save a lot of wear and tear if we would confine our practice work to a ship that would be ridiculously simple to build in the first place, and a snap to repair after the usual calamities. As a result of this line of thought, *Houn' Dog* evolved . . . . a perfect trainer for club work.

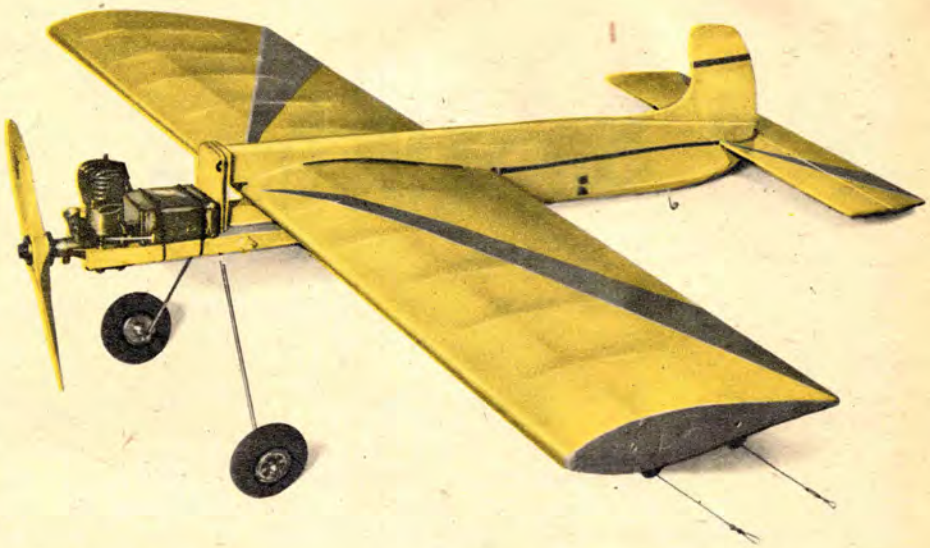
Houn' Dog is probably one of the most unbeautiful stunters anyone has dreamed up in a decade, but it has the qualities we were after. It can be tossed together 'most any old way, and if you happen to feel really carefree you can finish it off with a couple of coats of barn paint. The original sports a finish of rather sickly green automobile enamel. Nevertheless *Houn' Dog*, though not an airplane you can win contests with, will do inside and outside loops, horizontal eights, and inverted flight with ease.

As for repairs, it's designed so that the normal crack-up will just break the motor mounts where they're notched to hold the landing gear in place. When that happens, all you have to do is remove two bolts and slap in a new set. If you should get really frisky and chew the wing up, it can be replaced in about five minutes by just snipping the eight scraps of gauze that hold it on and sliding the lead-out wires out of their guides. The bellcrank is mounted on the bottom of the fuselage instead of inside the wing, for easy maintenance.

Now, if you don't think you'd be ashamed to have an old *Houn' Dog* around, gather up a few old scraps of balsa and let's get to work. A word of advice: don't be particular in your construction. If you haven't any 3/8" square balsa for the leading edge, for example, use 1/4" or 1/2" or whatever happens to be handy. And don't try to make *Houn' Dog* look pretty. We'll clue you: it can't be done.

For no particular reason that we can think of off-hand, let's start on the


STANDARD LEAD OUT WIRES
NO OFFSET REQUIRED
"TRIM-FILM" FLASH TO SUIT
"TRIM-FILM" TO SUIT
HARD 1/8" SHEET (NOTE GRAIN)
HEAVY SILKSPAN COVERING
SLOT FOR STABILIZER
SLOT FOR FIN & RUDDER
1/32" SHEET TOP & BOTTOM THRU CENTER SECTION
1/8" PLYWOOD LINE GUIDES (SEE DETAIL "B")
WASHER
1/2" SOFT SHEET (RD. EDGE TO SUIT)
GAUZE WING-FIX EA. SIDE
CLOTH HINGES
FUEL TANK - SECURE WIRE, TAPE OR RUBBER BANDS
"TRIM-FILM" FLASH TO SUIT
"GUILLOW" CONTROL HORN
WIRE GUIDE LOOP
1/16" WIRE SKID
1/8" HARD SHEET
1/16" WIRE PUSHROD
BOLT THRU
1/4" X 1" T/E SPAR
.29 TO .32 ENGINE
3/8" X 1/2" HARD-WOOD ENG. MOUNTS AND SPACER BLOCKS
1/16" MED. SHEET RIBS
3/8" X 1/2" NOSE PCS.
1/8" SHEET GUSSET
2-1/2" BELLCRANK (SEE DETAIL "A")
PROP TO SUIT ENGINE USED
3/16" SQ. WING SPARS
1/8" OR 3/32" MUSIC WIRE L/G STRUTS
3/8" SQ. ◆ L/E SPAR
2-1/2" DIA. WHEELS
1/8" HARD SHEET TIP RIBS
DOUGLAS ROLFE



wing. Cut eleven ribs out of medium hard 1/16" balsa sheet. Don't make the spar or L.E. notches yet. Now grab a piece of the hardest ⅛" sheet you can find, and make the two end ribs from the same pattern. We're not using wing tips, so the end ribs have got to be rugged. Done? All right, stack them up, bolt or clamp them all together, and, using a piece of 3/16" square balsa with coarse sandpaper cut to size and cemented along one edge, make the spar notches. Cut the leading edge notches with a saw. Now bevel the trailing edge unless you have a pre-shaped one on hand, and cut the rib notches in it with a hacksaw. This will give about the right width. Pin it down on the plan, propping up the rear edge so that it's level. Pin the bottom spar in position. Put some slow-drying cement into the T.E. notches and spar notches on the ribs, and slip the ribs into place.

When dry, turn it over, insert the other spar, and, finally, the leading edge. Plank the center section, weight the outer end with a couple of 1¼" flat washers or something, and cement the line guides to the inside of the end rib on the other end of the wing. Make sure you've cut the slots from the outside of the guide into the holes. These are put there so that the lead-outs can be removed when a new wing is installed. Cover the wing with heavy paper.

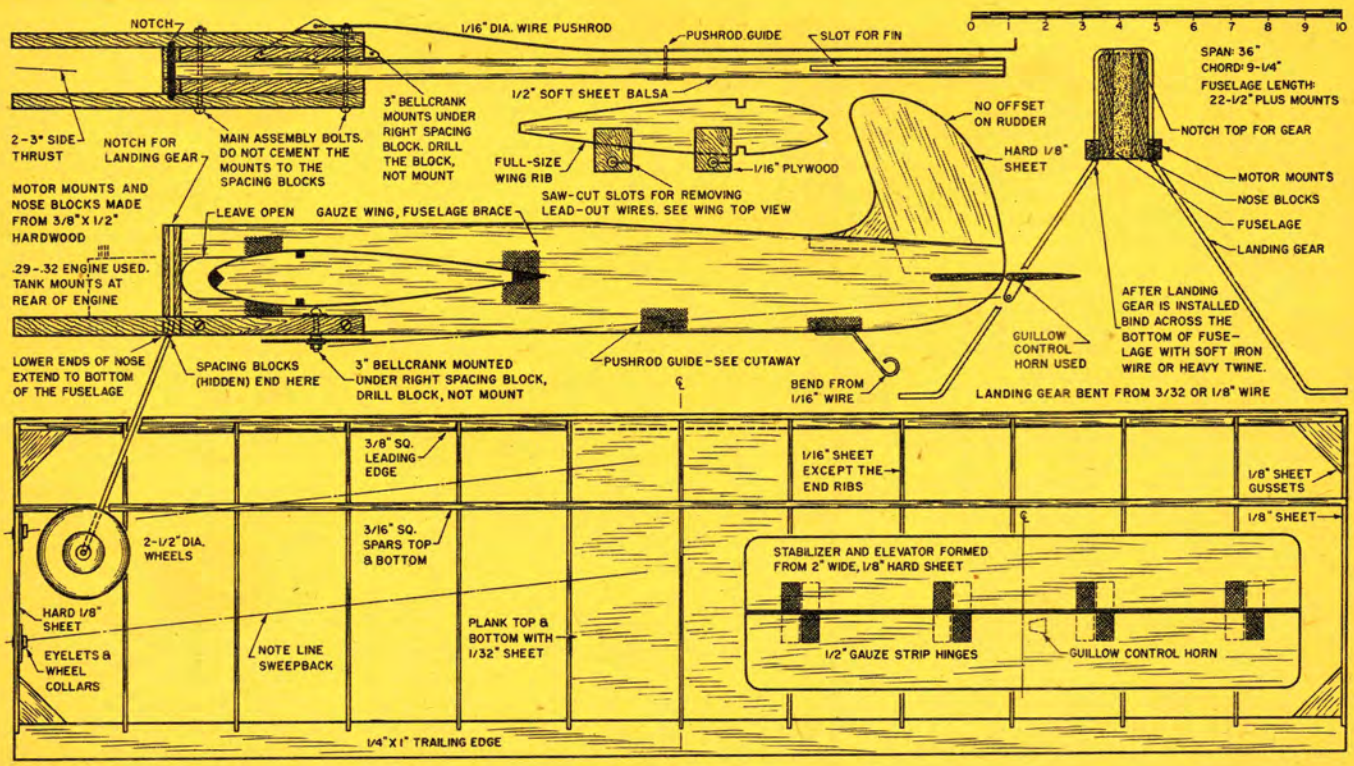
Now for the fuselage. Soft ½" balsa is probably your best bet, but you can substitute a really rock-hard piece of ¼" stuff, provided you cement pieces of ⅛" sheet to both sides of the front section, back as far as the rear of the motor mounts and spacing blocks. After whatever kind of half-hearted sanding job you feel in the mood for, cement the spacing blocks and nose blocks to both sides of the fuselage.

When these are thoroughly dry, notch across the tops of the nose blocks for the landing gear, and drill the right-hand spacing block for the bellcrank bolt. Now clamp your motor mounts in place, leaving them 12" long for the present, so that you can put your engine wherever you want it. Drill the two holes for the main assembly bolts, mark the locations for the landing gear notches in the mounts, remove the mounts, and cut the notches with a saw. The easiest method is to make two saw cuts ⅛" apart and pop the little chunk of wood out with a screwdriver.

Now install your tail surfaces and hook up your bellcrank and pushrod. Install the bellcrank bolt with the head up. It may be necessary to put a couple of flat washers between the spacing block and the bellcrank, to provide clearance.

Bend the landing gear out of ⅛" or 3/32" music wire, slide it into place, and bolt your mounts on. Bind the landing gear just under the fuselage with soft wire so that it can't work up and out of the top notch.

(*Continued on page* 59)


NOTCH
1/16" DIA. WIRE PUSHROD
PUSHROD GUIDE
SLOT FOR FIN
0 1 2 3 4 5 6 7 8 9 10
SPAN: 36"
CHORD: 9-1/4"
FUSELAGE LENGTH: 22-1/2" PLUS MOUNTS
3" BELLCRANK MOUNTS UNDER RIGHT SPACING BLOCK. DRILL THE BLOCK, NOT MOUNT
1/2" SOFT SHEET BALSA
NO OFFSET ON RUDDER
HARD 1/8" SHEET
NOTCH TOP FOR GEAR
2-3° SIDE THRUST
NOTCH FOR LANDING GEAR
MAIN ASSEMBLY BOLTS. DO NOT CEMENT THE MOUNTS TO THE SPACING BLOCKS
FULL-SIZE WING RIB
1/16" PLYWOOD
MOTOR MOUNTS
NOSE BLOCKS
FUSELAGE
LANDING GEAR
SAW-CUT SLOTS FOR REMOVING LEAD-OUT WIRES. SEE WING TOP VIEW
MOTOR MOUNTS AND NOSE BLOCKS MADE FROM 3/8" X 1/2" HARDWOOD
LEAVE OPEN
GAUZE WING, FUSELAGE BRACE
.29-.32 ENGINE USED. TANK MOUNTS AT REAR OF ENGINE
AFTER LANDING GEAR IS INSTALLED BIND ACROSS THE BOTTOM OF FUSELAGE WITH SOFT IRON WIRE OR HEAVY TWINE.
LOWER ENDS OF NOSE EXTEND TO BOTTOM OF THE FUSELAGE
SPACING BLOCKS (HIDDEN) END HERE
3" BELLCRANK MOUNTED UNDER RIGHT SPACING BLOCK, DRILL BLOCK, NOT MOUNT
PUSHROD GUIDE-SEE CUTAWAY
GUILLOW CONTROL HORN USED
BEND FROM 1/16" WIRE
LANDING GEAR BENT FROM 3/32 OR 1/8" WIRE
3/8" SQ. LEADING EDGE
1/16" SHEET EXCEPT THE END RIBS
1/8" SHEET GUSSETS
1/8" SHEET
2-1/2" DIA. WHEELS
3/16" SQ. SPARS TOP & BOTTOM
STABILIZER AND ELEVATOR FORMED FROM 2" WIDE, 1/8" HARD SHEET
HARD 1/8" SHEET
EYELETS & WHEEL COLLARS
NOTE LINE SWEEPBACK
PLANK TOP & BOTTOM WITH 1/32" SHEET
1/2" GAUZE STRIP HINGES
GUILLOW CONTROL HORN
1/4" X 1" TRAILING EDGE

Not So Simple- The History of

Astounds even Wright Field—U. S. A.'s only, unbeaten model jet engine

■ It was shortly after VJ-Day. The Big War was over. Like a couple of million other guys stationed stateside, the sergeant sat there at his desk in the big Equipment Laboratory at Wright Field, the Air Force test center near Dayton, Ohio, and felt the curlicues of a gigantic question-mark clawing at his future. What would he do now?

For months he had been engaged in some very "hot" projects—design and development of small engines for target planes. But suddenly, the projects turned lukewarm. He found himself sitting there with little or nothing to do. A guy with ambition could go nuts under such circumstances. And Sergeant Bill Tenney had ideas about the design of some new motors. He wanted to try them out, if for nothing else than to develop a faster engine for his outboard racing boat.

The then 30-year-old (he's now 37) Minneapolis-born enlisted man, a Yale graduate, decided he'd set up his own little experimental engine laboratory. Together with a friend, Charlie Marks of Las Vegas, he rented a three-car garage near the field and they started to delve into the mysteries of a new type two-cycle piston engine. To them it looked like the answer for a lot of power needs. Someday it might grow into a production item. In the future, maybe, they'd build this thing in their own factory. If they could design the kind of engine they hoped for, Tenney had some money he'd invest in its production. Temporarily, that should straighten out the question mark.

Today—seven years later—W. L. (Bill) Tenney is president and sole owner of the Shevlin Corporation, Vandalia, Ohio, a plant whose 14,000 square feet of factory space is bursting at its beams. It is doing work for the Army, the Navy, the Air Forces. For civilian consumption it is turning out model airplane motors, specially powered insecticide blowers, heaters and a whole list of new and revolutionary items.

But the irony of it all is that Tenney and Marks in their garage laboratory never did build that piston engine. What they did do, however, was to build a pulse-jet motor that, by and far, is the simplest prime mover ever built. It is so simple and it produces so much power, so efficiently, that even some of the German scientists who worked on the V-1 bombs which employed the same principle still shake their heads and say—impossible!

Simple in parts and operation, the little motor, initially trade-named the Dyna-Jet, was anything but simple in its development and perfection.

"It was," Tenney recalls, "a pulse jet all right; a thousand and one little throbs, each one a big slam-bang headache!"

It all started when Tenney, still in the Army, went down on the flight line at Wright Field to see an open house exhibit. On display was a German V-1 bomb. He took a quick look at the pulse jet motor and decided that it could be duplicated in miniature. He was sure he understood its theory of operation. So he went back to the garage that night and he and Marks started to build one.

They cobbled up the whole thing in about half a day, using crude materials. A piece of water pipe served as the taip-pipe. The casing from a 75-mm shell became the combustion chamber. The reed valve assembly they stole from the crankcase of a two-cycle engine.

"We put it on a test bench," Tenney said, "and the unfortunate thing is that it ran."

Adventurous Bill Tenney, the master-mind of Dyna-Jet, with his jet-powered motorcycle. Units are Aeromarine D5-1's—Dyna-Jets in cluster formation.

The embryonic baby jet was about six feet long and it weighed between 30 and 40 pounds. Actually it didn't have enough thrust to make you blink your eyes. But the important thing was—it ran. The principle was there. Tenney and Marks were sure they could miniaturize it, make it of lighter metals, come up with a small, powerful little motor. That's where the headaches began.

The second motor was made to order of two different diameter pieces of water pipe and razor blades. To get a proper thinness and strength for the intake valve (the only moving part in the engine) they tried out every size and shape of razor blade. Finally, after two weeks of burning the night oil, plus Saturdays and Sundays, they had the "baby" ready for test.

It didn't work!

the Dyna-Jet!

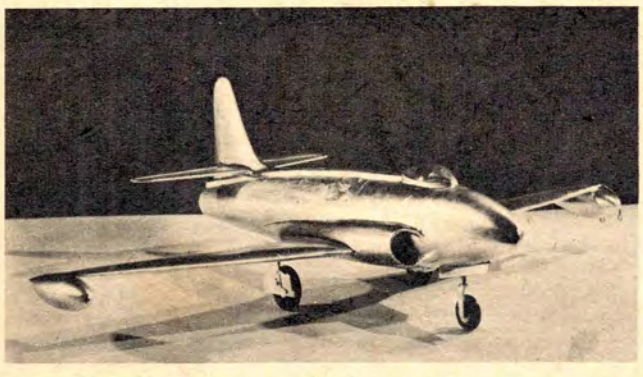
By DOUGLAS J. INGELLS

Try as they might, the two experimenters couldn't get their "white hope" to do anything but sputter and spit and die out. So, they tore it apart. In the process they found one thing which they were sure was causing the trouble. They changed it. Still the motor wouldn't run. They rebuilt it again. No luck. Another change in this part, then that one, and finally, they began to get some results.

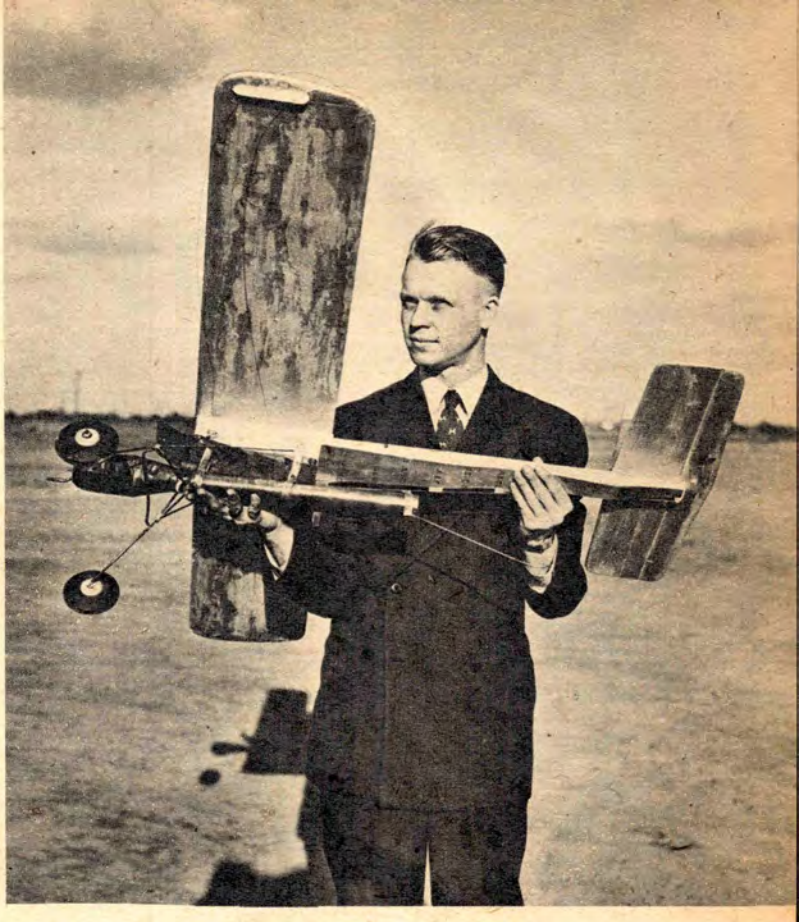
"We put it on the bench and it ran after a fashion," Tenney says. "But it was difficult to start. There was no valve endurance. The razor blades went blooey like they were cutting a wire beard. The thrust you could measure in fractions of an ounce. I remember we had a little scale which we used for measuring the breaker spring strength on a magneto. It would only take up to about eight ounces. We kept hoping for the hour when the pulse jet would kick out enough thrust to break the darn thing. It seemed like forever."

Weeks went by. Tenney got discharged. He could devote full time to the jet experiment. The challenge was such that both he and Marks forgot all about their piston engine. Like the Wright Brothers who had a bicycle business and suddenly found themselves in the airplane business, Tenney and Marks discovered they were in the jet engine business—win or lose.

It was more guesswork and prayer than anything else, and long hours in the workshop. They built hundreds of different configurations and combinations. Preconceived notions and theories about pulse jets went out the tailpipe like so much hot air. They found out you had to invert the process of trying to make an engine follow a theory. Engines don't think. Instead, you had to build the engine and find out what it wanted to do and then go back and build up the theory. It was the same kind of "monkey-wrench" engineering that enabled Kettering to design the self-starter for the automobile. Since there wasn't any formula, you just tried one darn thing after another until the contraption finally worked.



With models like this Tenney succeeded in convincing skeptical model builders across the country that the Dyna-Jet unit could be enclosed in a flying model.



For the devotee of the jet blast this is an historic "pic" indeed: William L. Tenney with the first model plane to be powered by a Dyna-Jet engine. The powerplant worked fine, but the aircraft's performance left much to be desired. Compare the model with today's sleek speedsters of 150 mph-plus.

Early in the spring of 1946 they had the answer. In fact, the small pulse jet motor turned out to be a miracle midget. It didn't know it, but for a baby it was doing things that its parents—the V-1 engines—never could do. The fuel versus thrust ratio was something nobody would believe.

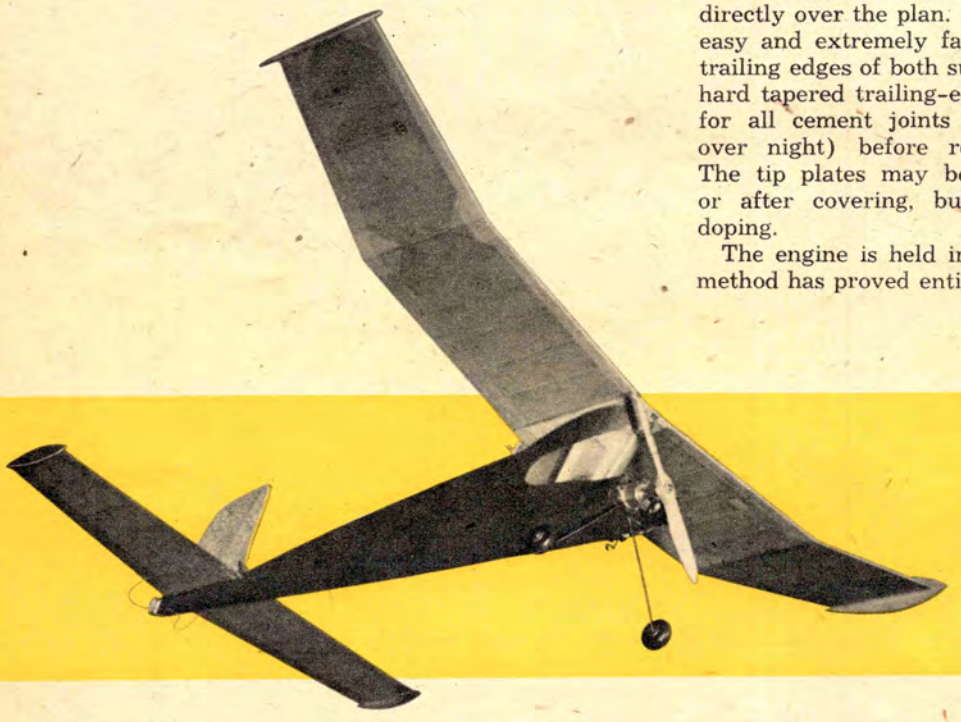
Now the engine became a simple thing. It had only seven parts including every nut and bolt, screw or washer to assemble it. The combustion chamber and tail-pipe were one unit of thin (15,000th inch) stainless steel. This was the principal part. The others included: the valve head hogged out of a solid aluminum bar stock; not a casting. The engine intake valve—only moving part—a flower-petal-shaped affair. The engine intake valve retainer. The engine intake valve retainer screw. A flow "injector" for metering fuel, also serving as starter—about the size of the valve on a bicycle tire. A spark plug.

This was the little power package—the Dyna-Jet. It has seen many modifications and changes for specific jobs but essentially the motors Shevlin Corporation is building today for numerous tasks differ very little from the initial product which took so long to turn from fantasy to fact.

It was little over 21 inches long. It weighed practically nothing—16 ounces! Having these characteristics, it seemed quite naturally that the engine would be ideal for model airplanes. Tenney saw in this field a chance to get some money coming into the "garage" which meanwhile had become a (*Continued on page* 55)

Tippy TIM

By AUBREY KOCHMAN



Wing-tip end plates which has all the best

■ Why not a model that will have the consistent non-erratic qualities of the cabin model and still retain the climbing ability of the pylon job? The end product of this line of thought is *Tippy Tim*. Its performance is even better than anticipated. It will handle all the power of a really hot .074, and presents no tricky adjustment problems such as down thrust, side thrust, wing warping etc.

The model, although a compromise between cabin and pylon ships, flies to the right under power. The diameter of this circle is controlled by the pitch of the propeller. An Aerobatic 7/3 prop resulted in a circle of approximately 75-feet diameter. Tilting the stabilizer down on the left side (looking at the model from the front) will cause a left circle in the glide. A 1/16″ shim under the right side of the stabilizer is about right. Numerous flight tests using various sized wings and stabs both with and without tip plates proved that the shorter span surfaces with tip plates greatly increased performances in both the climb and the glide.

Construction is fairly simple. The fuselage is built on a crutch of medium hard ⅛″ x ⅝″ balsa. Pin these crutch pieces directly over the top view and cement all formers in place including the firewall with landing gear installed. The keel piece should be cut very accurately as it controls the wing incidence. If a flight timer is to be used, install it at this time. The fuel tank should fit snugly between formers #1 and #2.

If care is taken, a single sheet of 1/16″ x 6″ x 36″ along with pieces of the 1/16″ x 3″ x 36″ sheet required for ribs, formers etc. will cover the entire fuselage. Prebend where necessary via the cement and water method. Cement the wing and stabilizer hold-down fittings in place before adding the bottom sheeting. For extra strength and to prevent splitting on contact with trees or fences, cover the fuselage with lightweight paper and apply at least two coats of clear dope.

The wing and stabilizer should also be constructed directly over the plan. The sparless type, they are both easy and extremely fast to build. Leading edges and trailing edges of both surfaces are formed from medium hard tapered trailing-edge stock. Allow plenty of time for all cement joints to dry thoroughly (preferably over night) before removing from the workboard. The tip plates may be added either before covering or after covering, but before water shrinking and doping.

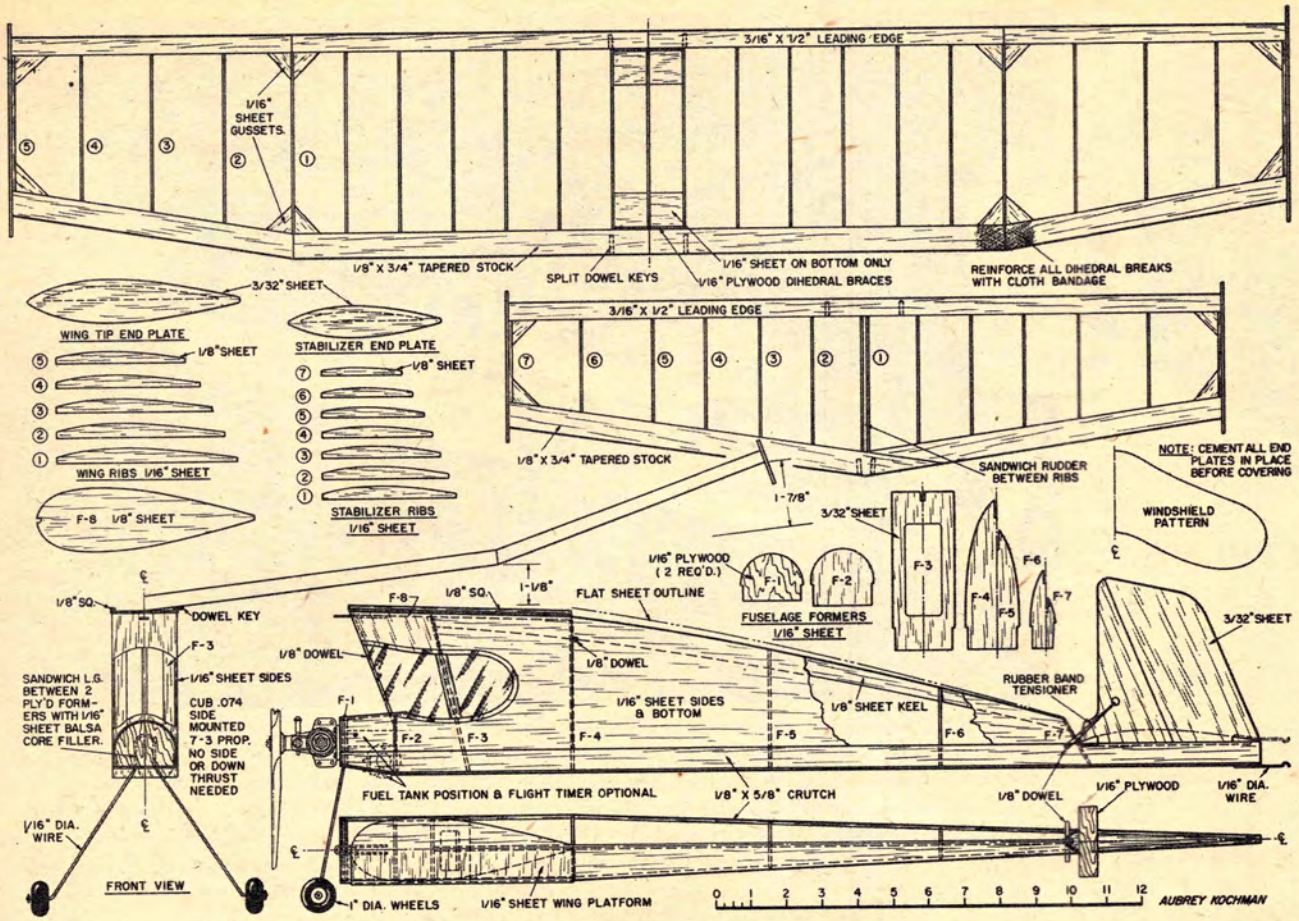
The engine is held in place with wood screws. This method has proved entirely dependable and is an added safety factor under hard impact loads. The screws will pull out, thereby reducing damage to the engine or the fuselage.

The finished model should weigh between 7½ and 8 ounces. The C.G. location is approximately one inch in from the trailing edge of the wing.

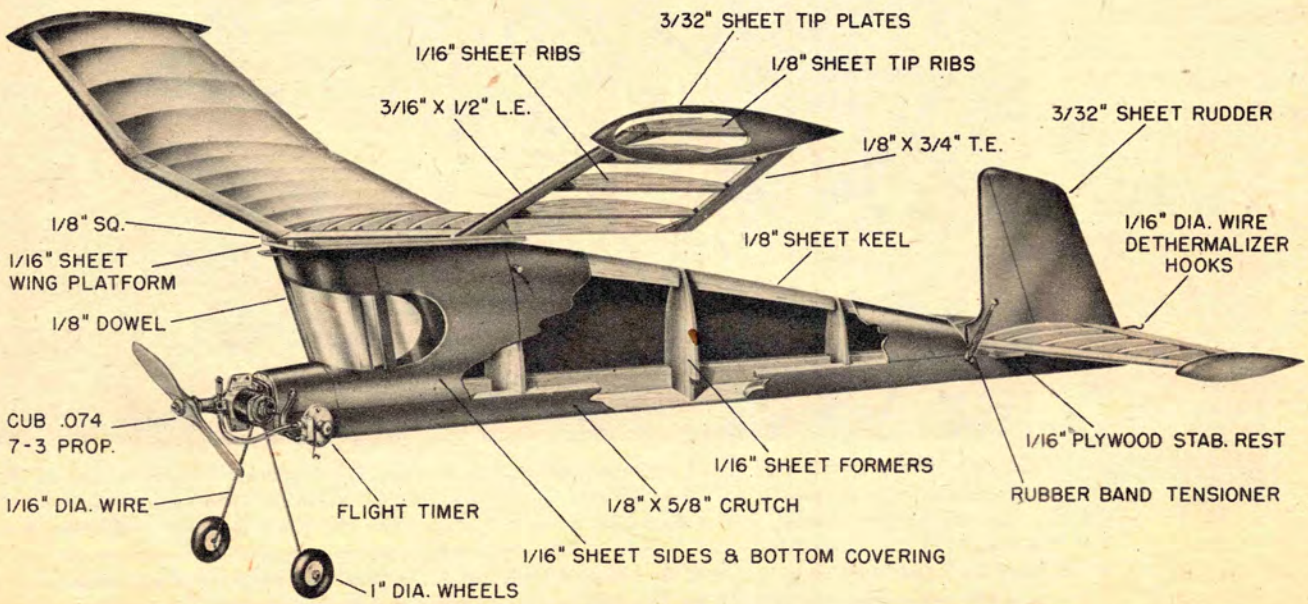
Don't forget to key the wing and stabilizer to the fuselage. The model is equipped with a dethermalizer; use it even during test flights. Too many models are lost simply because owners are either too lazy or simply forget to insert or light the fuse before launching. And a little care means a lot more fun.

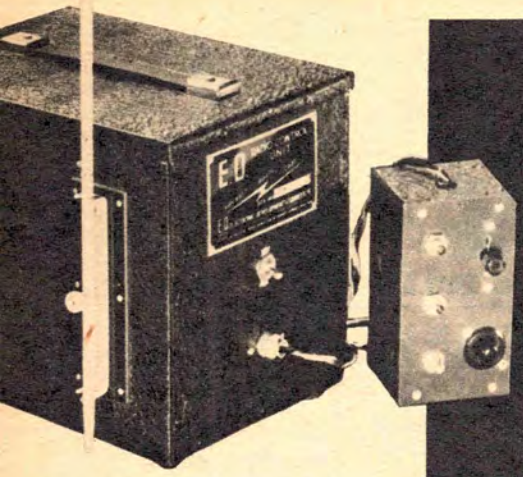
BILL OF MATERIALS—TIPPY TIM

2 pcs. ⅛″ x ⅝″ x 36″ med. hard. 2 pcs. ⅛″ x ¾″ x 36″ tapered T.E. stock, med. hard. 2 pcs. 3/16″ x ½″ x 36″ tapered T.E. stock, med. hard. 1 sheet 1/16″ x 3″ x 36″. 1 sheet 1/16″ x 6″ x 36″. 1 sheet ⅛″ x 2″ x 36″. 1 sheet 3/32″ x 3″ x 36″. 1 pc. 1/16″ dia. wire. 1 pr. 1″ dia. wheels. ⅛″ dowel, celluloid, 1/16″ plywood, paper, bandage, cement, clear dope etc.

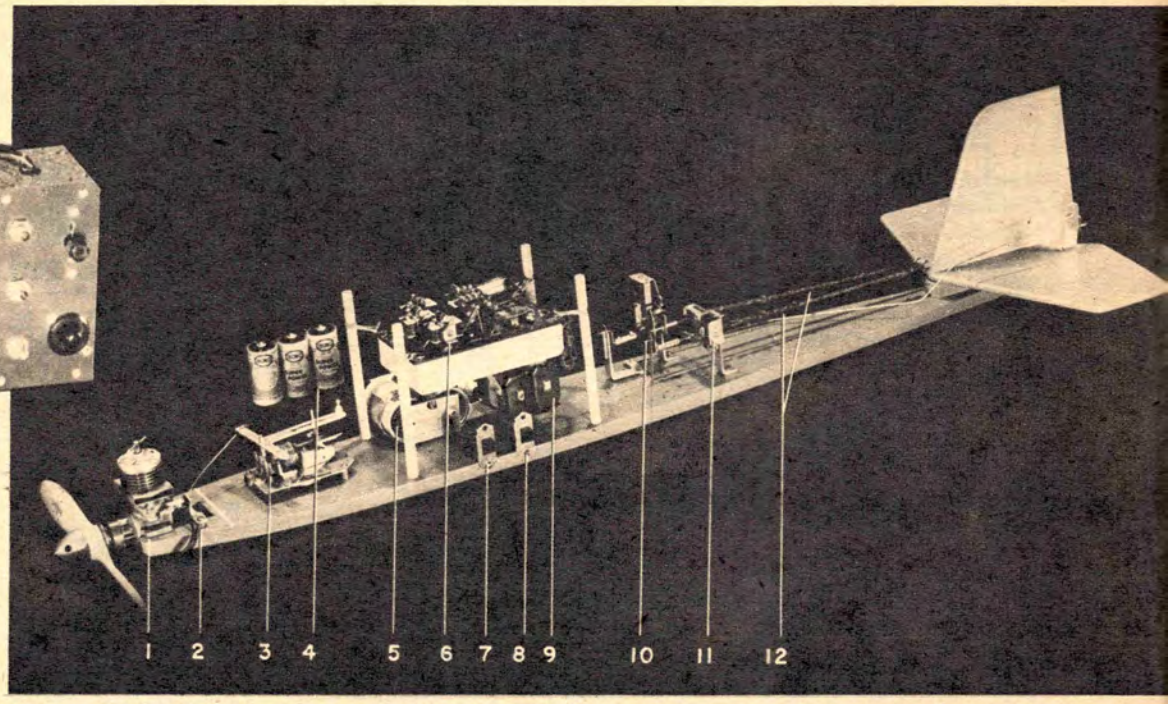


distinguish this cabin-type free flight features of a small CI. A pylon design





POLK'S
E.D.

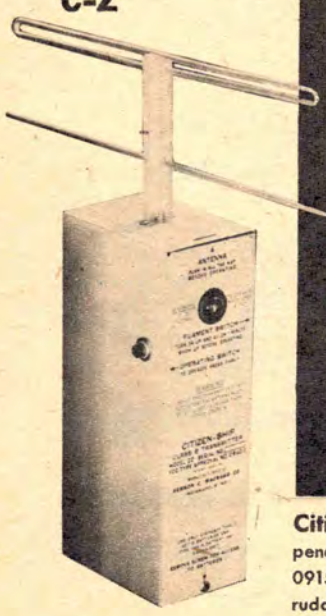


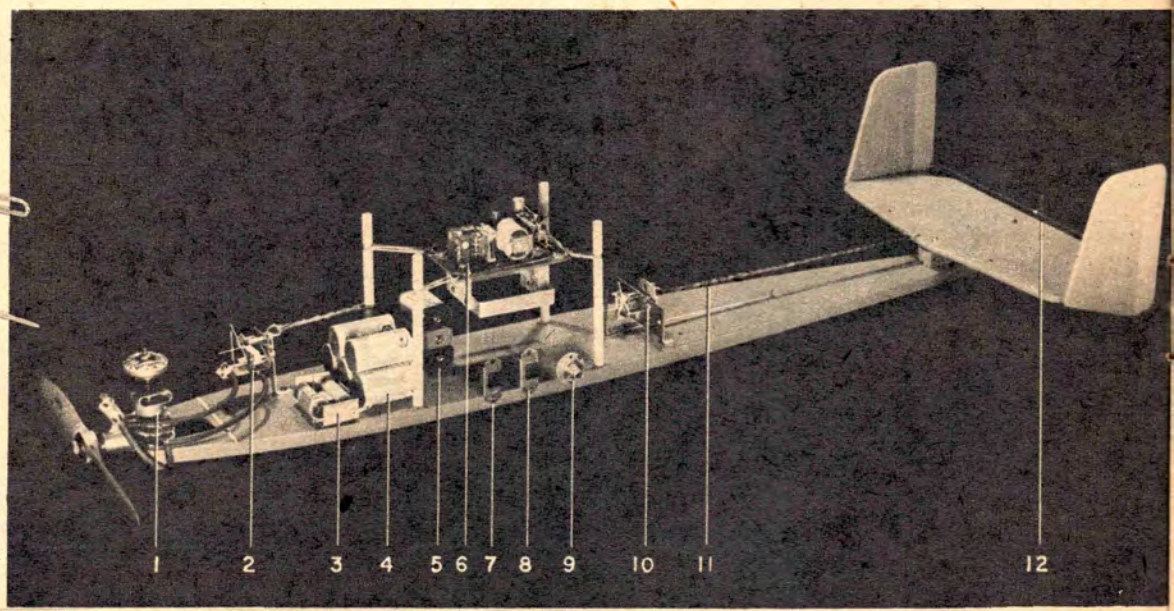
E.D. on 27¼ mc: 1) E.D. .15 cu. in. diesel; **2)** throttle vane; **3)** E.D. clockwork escapement for engine; **4)** 3 med. Bond 101 batts in series for motor escap.; **5)** two large Bond 102 cells in parallel in holder for fil. A; **6)** E.D. reed receiver MK IV; **7 & 8)** S.P.S.T. switches; **9)** 2 med. B batts in series, Olin 0918· **10)** E.D. Mk III esc. for elevator with Citizen-Ship bellcrank; **11)** E.D. Mk III esc. for rudder; **12)** escapement rubber. Inset shows the E.D. Mk IV transmitter with attached antenna and separate control box. Batteries used here are 3 Olin 6210 B in series for 135 volts and 2 Olin 4816 A in series for 3 volts. Wiring has been omitted in the interests of clarity in all these set-ups. This is for a big plane since receiver is fairly heavy.

MANUAL OF RADIO CONTROL:

Planning Your R/C Set-up

MACNABB'S
C-Z





Citizen-Ship on 465 mc: 1) K&B .19 engine with dual needle valve; **2)** Bonner motor control escapement; **3)** 2 pencells in series for escapement; **4)** five medium cells in series for A, Olin 101's; **5)** three 22 volt batts in series for B, Olin 0915's; **6)** Macnabb receiver; **7 and 8)** S.P.S.T. switches; **9)** meter jack; **10)** Bonner compound escapement for twin rudders; **11)** escapement rubber; **12)** escapement linkage. Inset is Macnabb transmitter with attached antenna. Batteries used are 2 Olin 1710's for 67½ volts B; one Olin 4914 for 6 volts A. The Citizen-Ship transmitter is self-contained with its own little beam antenna on top and is always hand-held. Twin rudders give same amount of turn under power as in glide.

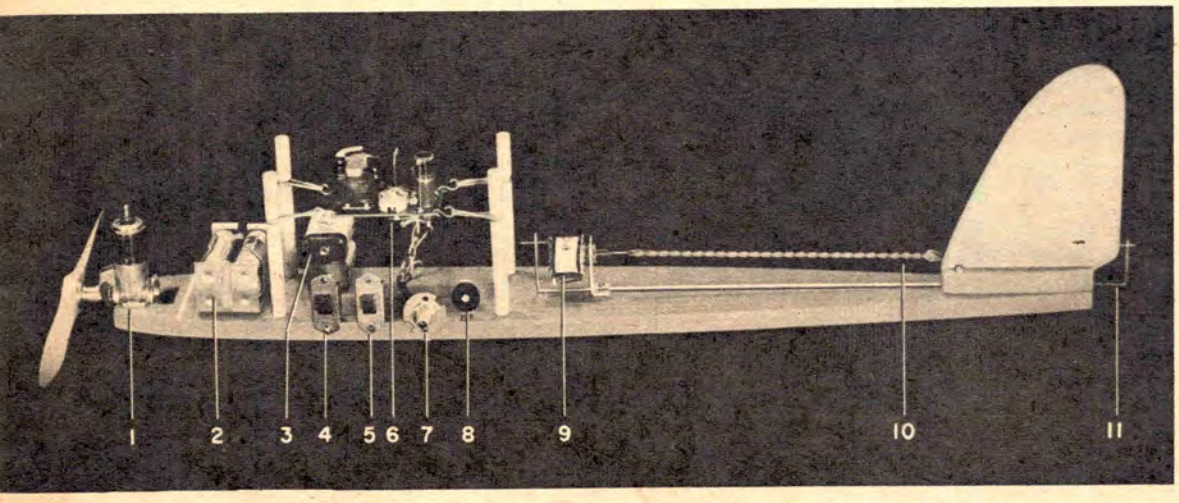
THE BUYER'S GUIDE

■ The old-timers in R/C know just where to go to purchase most anything they need, but newcomers are not so fortunate. Here are addresses of concerns supplying practically anything you may need in the R/C line.

Receivers and Transmitters: Ace Model Supply, 331 N. Elm St., Fairborn, Ohio—27¼ transmitter kit**, less case and ant. American Telasco Ltd., Huntington, N. Y.—E.C.C. transmitters, hard and gas tube receivers (both single tubers). Berkeley Model Supplies, West Hempstead, N. Y.—Super-Aerotrol trans. and rec. for 27¼*; DE-Aerotrol trans.** and rec.** for 50 mc. North American Model Products, 9802 Warwick Rd., Newport News, Va.—Control Research two-tube receiver for 27¼. Harry Geyer, 7401 Schoyer St., Pittsburgh 18, Pa.—Good Bros. trans. and rec. for 27¼ and 50. Vernon C. Macnabb Co., 909 Westfield Blvd. Indianapolis 20, Ind. — Citizen-Ship trans. and rec. for 465; 27¼ trans. and rec. Polk's Model Craft Hobbies, Inc., 314 Fifth Ave., New York City 1, N. Y. —E.D. three-channel tone control trans. and rec. for 27¼; E.D. gas tube rec. and Aristrol trans. for 27¼. Rockwood Radio Controls, Box 762, Walnut Creek, Calif.—1 to 5 channel tone control trans. and rec. Radio Control Headquarters, Belmar, N. J.—27¼ mc. trans. and rec.**; 50 mc. trans. and rec.** All American Model Motor Exchange, Box 885, Santa Monica, Calif.—various makes of R/C outfits.

Those concerns with an asterisk after the name offer their products in kit form as well as built up. With two asterisks, available in kit form only. Control Research, Box 9, Hampton, Va. can supply kits for 27¼ trans. and rec. described in 1952 A.T. Annual. Most of the concerns listed will convert their 50 mc. equipment to 27¼.

R/C Accessories: American Telasco—E.C.C. escapement and sensitive relay. Berkeley Model Supplies—low-cost test meters, dust-core coil, escapement, tubes, crystals, batteries. Bonner Specialties, 1607 S. Bundy Dr., Los Angeles 25—three types of escapements; self-neutralizing, compound, motor control. Control Research—tubes, meters, crystals, beep box, various small R/C components. Harry Geyer—Good Bros. four-arm escapement. K&B Mfg. Co., 224 E. Palmer Ave., Compton, Calif.—K&B .19 engine with twin needle valves for use with Bonner motor control escapement. Vernon Macnabb Co.—two- and four-arm escapements, R/C test meter, R/C bellcrank and rudder horn. Osborn Hobby Associates, 586 Osborn St., Brooklyn 12, N. Y.—Automatic R/C Switch for keying transmitter. Polk's—three types of E.D. escapements, clockwork, regular, compact; E.D. sensitive relays and tone control reed unit; Mills throttle for small engines; tubes, crystals, batteries (*Continued on page* 54)



SUPER AEROTROL

Aerotrol on 27¼ mc: 1) Herkimer Cub OK .099 engine; **2)** four pencells in holder, 2 in series for escapement, 2 in parallel for fil. A; **3)** two 22 volt B batts in series, Olin 0915's; **4 and 5)** two S.P.S.T. switches; **6)** Super Aerotrol receiver; **7)** meter jack; **8)** potentiometer; **9)** Super Aerotrol escapement; **10)** escapement rubber; **11)** linkage. In all three mock-ups we have shown the minimum number of switches required for convenient operation. The Super-Aerotrol transmitter is normally hand-held, since the antenna is only 5 feet long. The transmitter weighs about the same as the Citizen-Ship unit, or a bit over 3 pounds complete with batteries. All the equipment shown on these pages may be operated without taking any exam.

■ With the number of new R/C transmitters, receivers, and units of control equipment on the market expanding continually, the beginner in this field finds it harder and harder to make up his mind what he wants, or even to visualize the various control set-ups. To help him a bit, we have made three mock-ups of R/C plans, including all the radio elements, and the various surfaces that can be operated. Going a little further, we even put an engine on each, to show what may be considered representative. Note carefully that our selections of equipment, engines, and control surfaces are just three out of dozens that can be chosen.

The E.D. is a super de luxe type of set-up, that will do everything that can be done with any equipment now on the market. We show an E.D. audio tone receiver using tuned reeds, with three escapements. Rudder and elevator are moved by E.D. "current saver" escapements; the rudder is moved by a standard rocking type linkage, while something new is used on the elevator—a Citizen-Ship bellcrank. The control escapement for the E.D. .15 diesel is of the clockwork type; these are not very widely used for rudder, since the number of operations is limited to about 50. However, they are ideal for motor throttling, as this control is not used so much, and there is no rubber band to string through the fuselage. We show a simple vane over the intake tube, to slow down the engine.

The E.D. transmitter is fitted with a switch box allowing instant choice of any of the three control functions.

The sole 465 mc. unit on the market, the Citizen-Ship outfit is used in the second mock-up, and the twin rudders are moved by a Bonner Compound escapement. This gadget does not require sequence operation, as do other types of escapements—you get left or right as you push the button. It also has a pair of contacts that may be used to control a Bonner Motor escapement, which is seen just in back of the engine. For power, we have picked the K&B .19, since it (*Continued on page* 54)

U.S. Preparing Listing for School Model Clubs

■ The Office of Education in Washington is preparing a list of school-sponsored model airplane clubs. If you attend a junior or senior high school which promotes air-modeling the O of E would like to know about it. With a directory of school model aero groups available, inter-school competitions can be set up and an exchange of ideas established.

Not only the government—*we'd* like to hear of such clubs, too. So why not typewrite the following info for Washington and send a carbon copy to "AT"? Give the name of your school, town, state, name of club, name of president, when club meets, number of members, list contests and exhibitions planned. Send this to Willis C. Brown, Specialist for Aviation Education, U. S. Office of Education, Washington 25, D. C. (With a copy to Air Trails, 304 E. 45th St., New York 17, N. Y.) A listing will be made of all clubs responding. Be sure and get your school in the first directory. Copies will be available to all who cooperate. You automatically qualify for a copy of the list by sending in the facts about your club.

What do you say—do it today! Maybe some real material assistance will develop if a large enough list can be set up.

Big Baggage Car Meet. Somehow in the mad press of contest activities we missed attending one of the most important competitions of the past season. It's an annual affair, and although the dates are fairly well fixed (just after the Detroit Plymouth meet each year) no one can say just where the meet was held.

Sounds peculiar, doesn't it? But it wouldn't if you had been a participant in the "Robbers Baggage Car Glider Contest" held throughout one Wednesday somewhere between Detroit and California. It was back in 1950 that John Brodbeck of K&B came up with the idea of a baggage car contest while accompanying the California contingent on the return from the Plymouth Internationals. No data on the type of model, times or winners' names is available from that first memorable competition, but in 1951 "Mom" and "Pop" Robbers carried on. Jack Ritner set the best time on that trip with a three-flight total of 18.1 seconds and a high single flight of 6.4 seconds. All of this at a 90 mph clip, you understand, as the passenger train skims across the Western terrain.

The formal regulations call for a standard monoplane type glider—no canards. (Why? we ask. If the launcher faces to the rear of the train and lets the glider go—if it's a tail-ender—in relation to the ground it is moving westward . . . so. . . .) Maximum wing size to be 4 inch span by 1 inch chord with stab limited to 2 inch span by ¾ inch chord maximum. Glider must be hand-launched within designated (*Continued on page 60*)

CONTROL-LINE Retracting Gear

By LT. WILLIAM L. JANSSEN, USAF

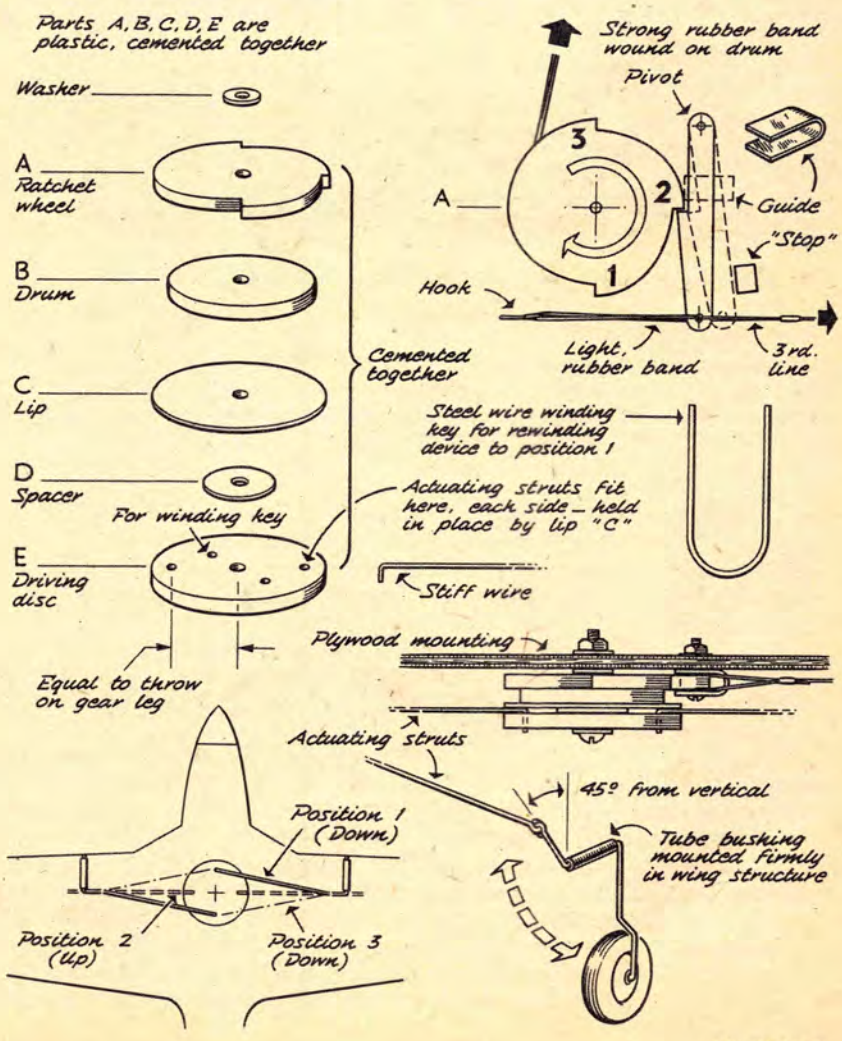
■ Here is a light, simple landing gear retracting mechanism that can be easily adapted to control line models of practically any size. The entire mechanism consists of seven parts readily constructed of plastic and powered by a rubber motor. I chose plastic although any hard, light material will work, including aluminum.

In use, after the model is airborne, a third line is given a slight pull, retracting the gear, and raising the flaps if desired. Upon completion of the flight the line is pulled again, lowering the gear and flaps for landing.

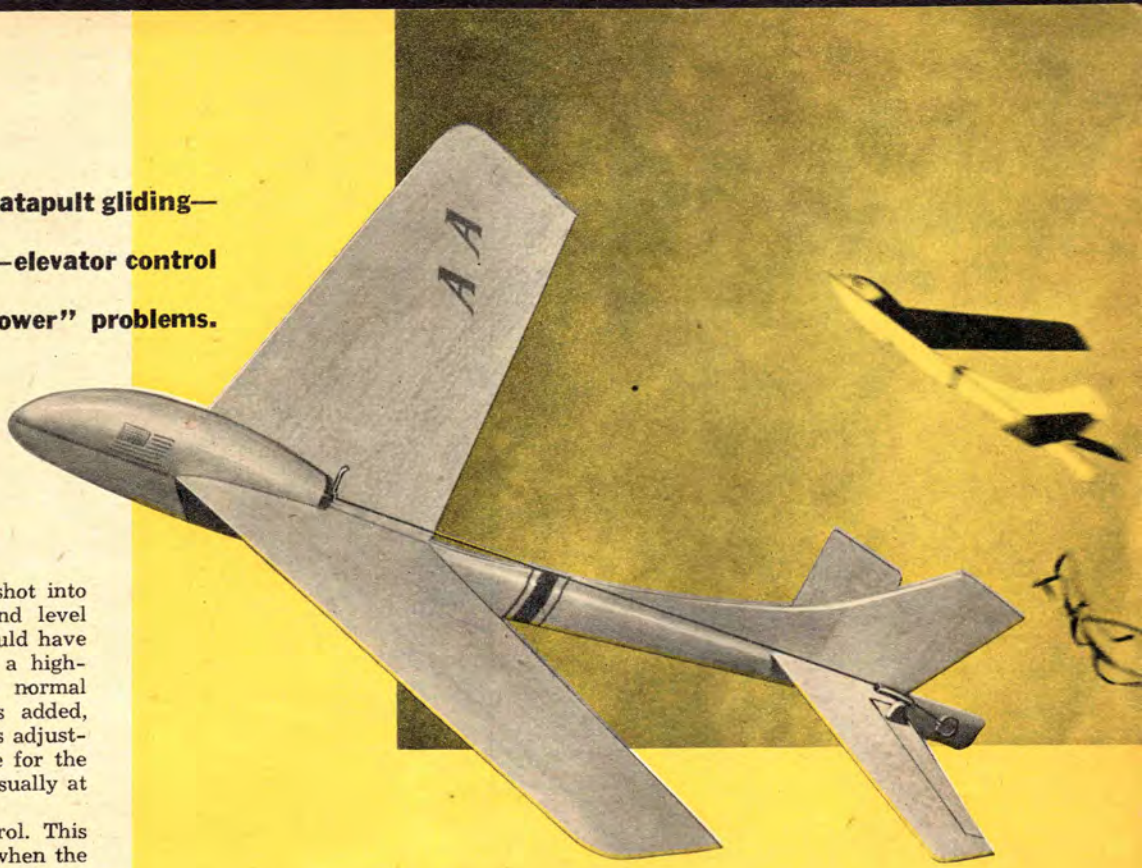
The unit is a series of plastic discs glued together including a ratchet, drum for the rubber power and what might be called the actuating cylinder or disc. The whole unit must rotate smoothly on a pivot easily constructed from a rod or bolt of suitable diameter, mounted on a base of plywood or plastic. The actuating rods that go to the gear and flap levers are mounted in the actuating cylinder and are held in place when the cylinder is glued to the remainder of the unit. Bicycle spokes seem ideal for the rods.

The entire unit rotates to three positions powered by a heavy rubber band wound around the drum and fastened to a convenient place in the aircraft. Tests will show the proper tension to place on the band for proper retraction of the gear. A lever release riding in a guide and sprung by a light rubber band releases the cylinder for the one quarter rotation that is the basis of the unit. The unit is re-cycled upon the completion of each flight; this is easily accomplished by using a winding key of heavy wire that will fit into holes in the top of the actuating cylinder.

The unit should be mounted either to the forward or the rear of the main gear so that the actuating rods will clear the main wheels when retracted.



For some real thrills try catapult gliding—with a model, of course—elevator control is clever solution to "power" problems.



MINOR MACH

■ Ever see a catapult glider shot into the air, loop several times and level off not much higher than it could have been hand launched? If such a high-speed glider is adjusted for normal flight and excessive power is added, a loop is bound to occur unless adjustments are made to compensate for the power. However, this is done usually at a sacrifice to the glide.

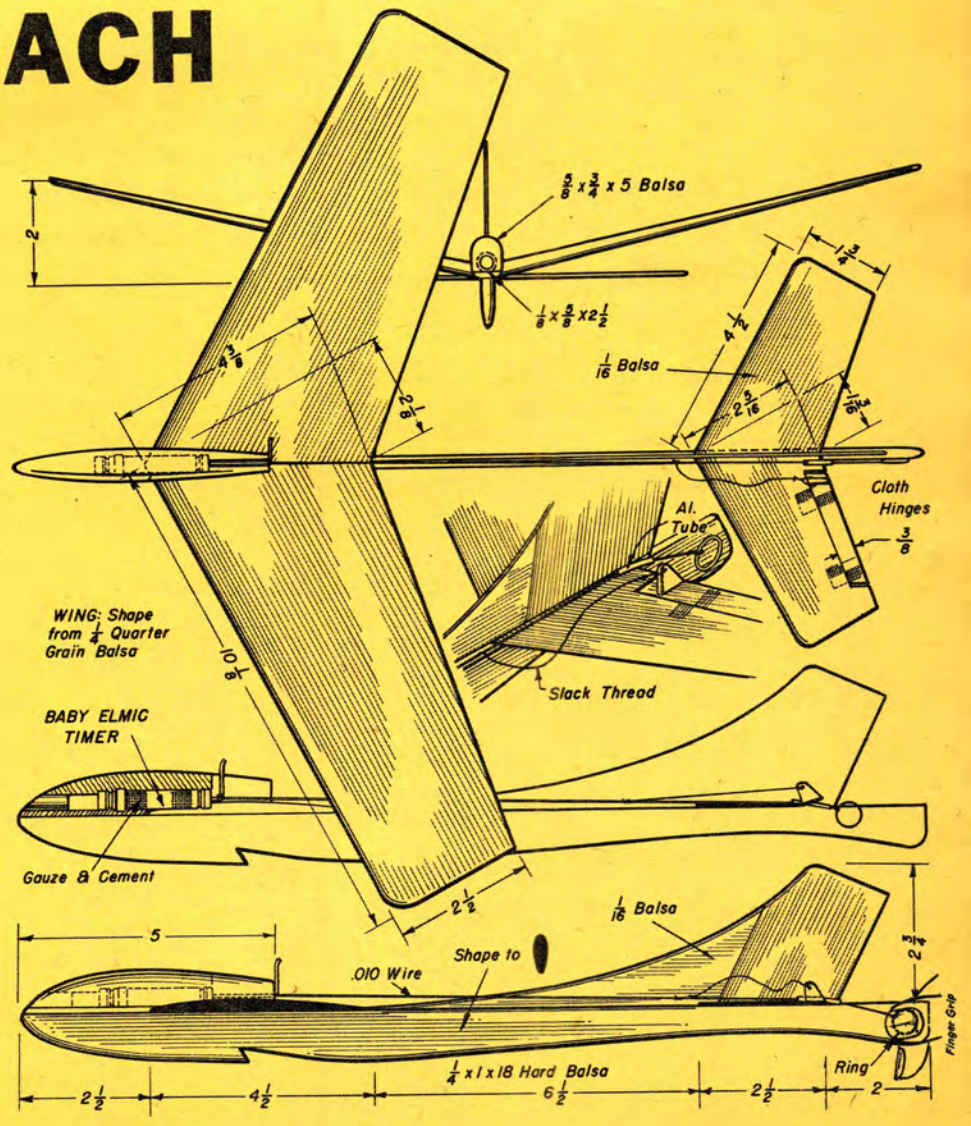
The solution? Elevator control. This was utilized a long time back when the early gas models had a tendency to loop. Then we had the timer hold the stab trailing edge down while power was on and then come back to normal when the engine stopped. The system as applied to the catapult glider meant we could keep adding power and making adjustments for the power increase to prevent the glider from looping.

You can shoot this glider up almost out of sight, then watch the timer pull the elevator up when the power is spent, enabling the ship to slowly glide back to earth. The single elevator was used to produce drag on one side and encourage the model to circle without the aid of the rudder (which would give trouble in the climb).

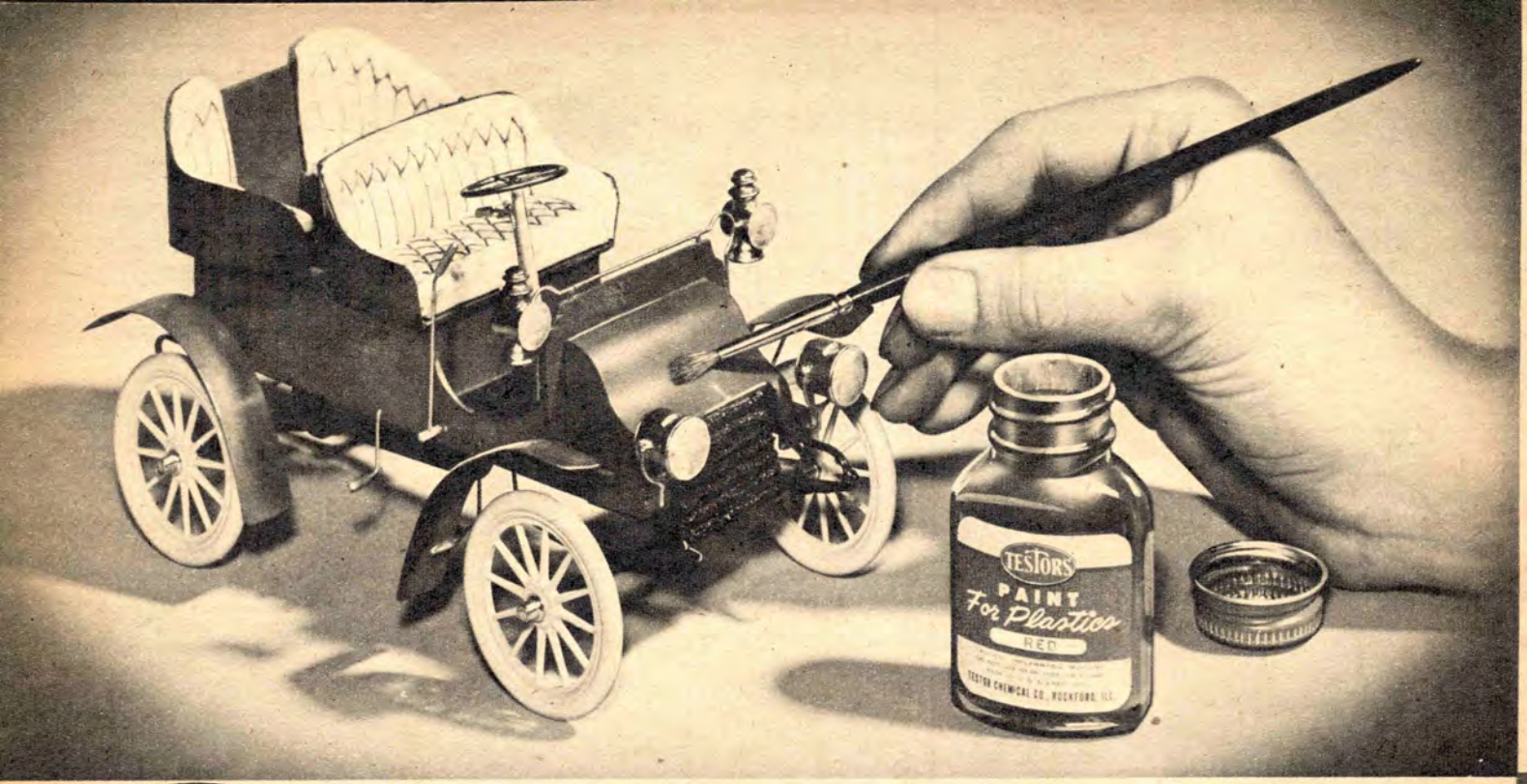
The model should be completely polished to reduce the drag to a minimum.

With the careful selection of straight-grained wood, the ship will weigh in around an ounce and a half before adding the timer and balance weight. As this model is powered with fifty strands of rubber, it must be strong and well streamlined and trimmed perfectly to produce a fast flat glide.

To start the model, the wing is made first to allow the dihedral to dry well, as this is where the most strain is placed when the ship is climbing. When cementing the (*Continued on page 72*)



By FRANK EHLING



TESTORS PAINTS FOR PLASTICS GIVE IDEAL FINISH TO WOOD MINIATURES AS WELL AS PLASTIC KITS!

Because Testors Paint for Plastics closely resembles the best automotive enamels, it is an ideal high-gloss finishing material for "Old Timers" and similar model cars made of plastic, wood, or metal. Futhermore — because it is extremely weather-resistant — it gives excellent results when applied to boats or other models used outdoors. Testors Paint for Plastics brushes on easily . . . provides one-coat coverage with good adhesion on glossy surfaces . . . can be applied over a still-wet coat without smudging or blending . . . dries hard and slick. Available in 10 popular colors: Gray, Blue, Silver, Red, Green, Olive Drab, Orange, Yellow, Black, White; also Thinner. Price: 15c per bottle.

Also for Christmas

TESTORS AUTHENTIC SCALE MODELS FOR YOUR DISPLAY COLLECTION

You might drop a hint to Santa Claus that you would like one (or more) of the history-making planes in this Testors series of authentic scale model kits . . . remember them on your own gift list for friends, too. Three headliners to choose from . . . the British Spitfire MK-19, our own F-86 Sabre Jet, and the Russian Jet MIG-15. You'll really appreciate their detail and design, their realistic appearance . . . and you'll find them wonderfully easy to build because of such features as molded balsa parts and Testors exclusive Key-Lok assembly. Available at dealers everywhere!

MODEL	WINGSPAN	OVERALL LENGTH	PRICE
Spitfire	17½"	16"	$1.50
F-86 Sabre Jet	17"	19"	$2.00
MIG-15	15¾"	16¼"	$2.00

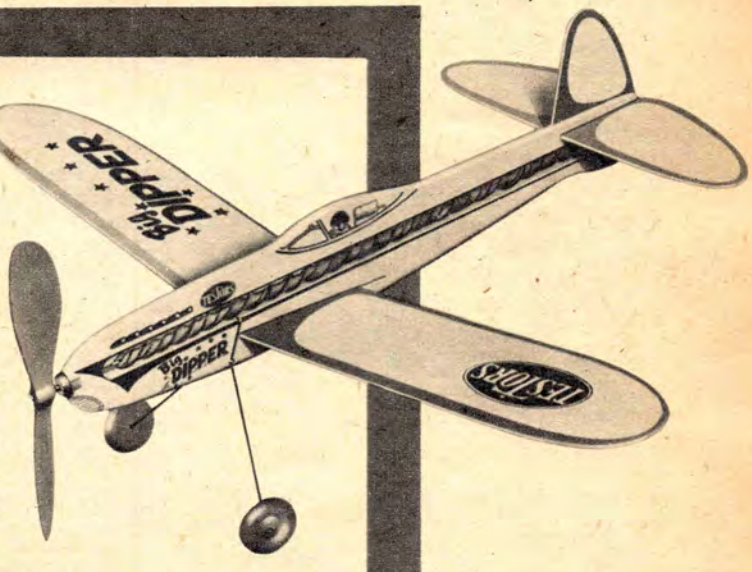
There's no time like Christmas to start a young friend on your model airplane hobby.

Make it easy for him with

TESTORS

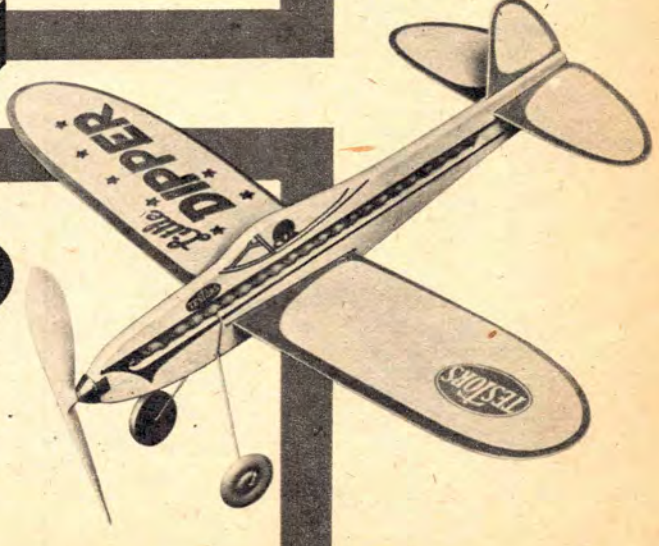
MILESTONE MODELS PROGRAM

BIG DIPPER $1.00



Rubber-powered . . . ready-to-fly . . . individually packaged! Testors Big Dipper will mean many hours of flying fun . . . is dandy training to teach the fundamentals of more advanced model aeronautics. The Dipper has all-balsa construction . . . profile fuselage with rounded top and bottom . . . realistic canopy design . . . plastic prop and nose piece . . . colorful detailed trim . . . wire landing gear with free-rolling wheels. Rubber motors are quickly and easily replaceable. Dimensions: wingspan, 21″; overall length, 16″.

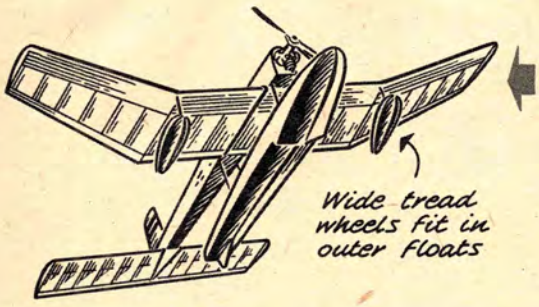
TESTORS 2ND MILESTONE MODEL



LITTLE DIPPER 50¢

This top-performing little beauty is a scaled-down version of the Big Dipper. It has the same fine features . . . comes individually packaged, ready-to-fly. Dimensions: wingspan — 15″; overall length — 11″.

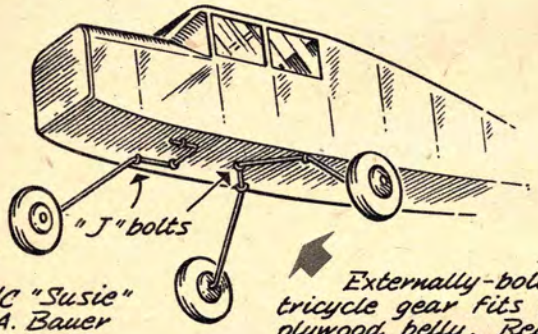
SKETCHBOOK



Wide tread wheels fit in outer floats

Walt Mooney's trim A/2 low-wing was convertible R.O.G. & R.O.W. entry (also payload) ... Made all water take-offs successfully —

Sewn pliofilm "Prang Bags" by Dallas speed boys Clem, Beasley and Swenson, made dust-proof carriers for speed jobs... handy for carrying home debris —

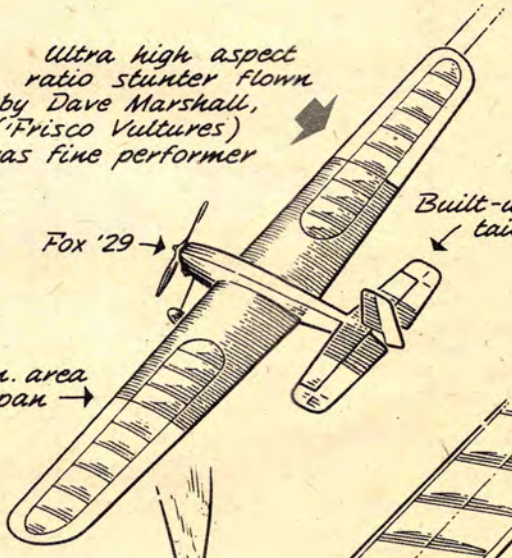


"J" bolts

R/C "Susie" by A. Bauer made fine unassisted take-offs.

Externally-bolted tricycle gear fits against plywood belly. Rear legs longer than front strut —

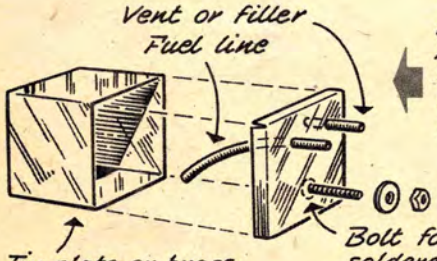
Ultra high aspect ratio stunter flown by Dave Marshall, ('Frisco Vultures) was fine performer



Fox '29

Built-up tail

720 sq. in. area
6'-8" span

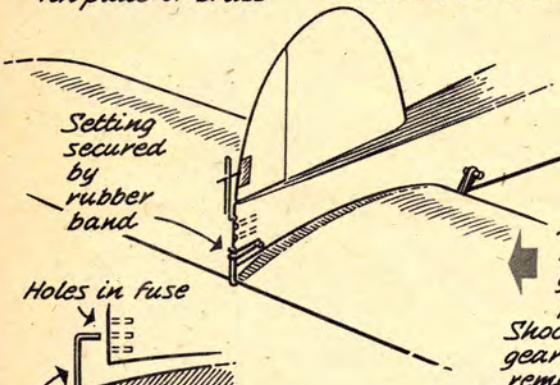


Vent or filler
Fuel line

William Cranford, Puente, Calif., uses this clever method of mounting special tank behind firewall —

Bolt for mounting, soldered inside lid

Tin plate or brass



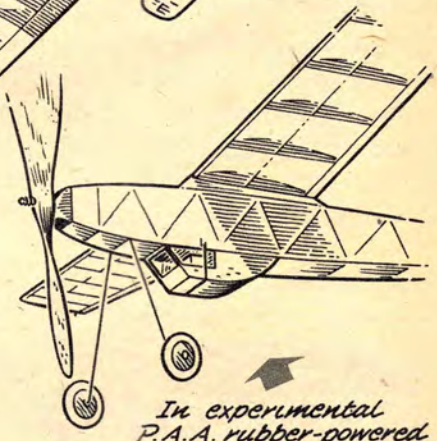
Setting secured by rubber band

Holes in fuse

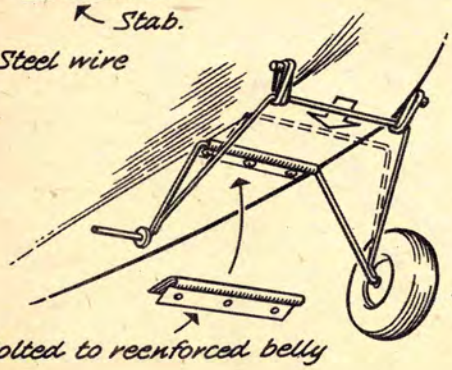
Stab.

Steel wire

Two nifty ideas seen in radio model of Dick Schumacher, Van Nuys, Calif. — Adjustable trim device for stabilizer incidence gives accurate and positive settings ... Shock absorbing landing gear may be entirely removed with screw driver...

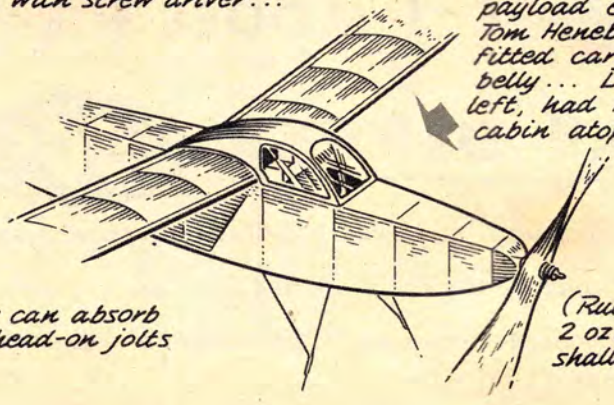


In experimental P.A.A. rubber-powered payload event, C.P.O. Tom Henebry (above) fitted cargo cabin in belly ... Lo Salisbury, left, had removable cabin atop fuselage



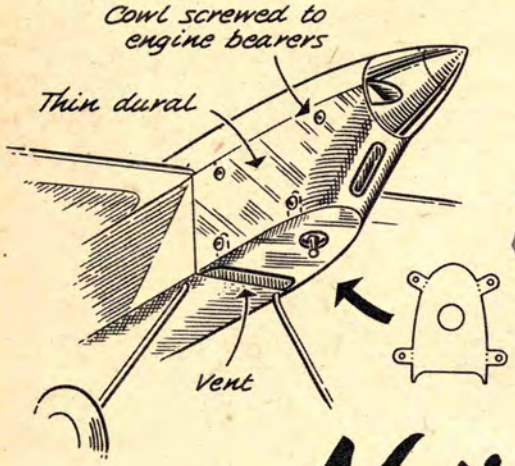
Gear can absorb heavy head-on jolts

Bolted to reenforced belly

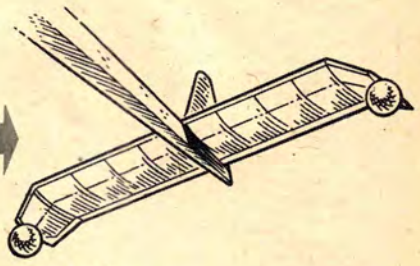


(Rules specify 2 oz. dummy of shallow height)

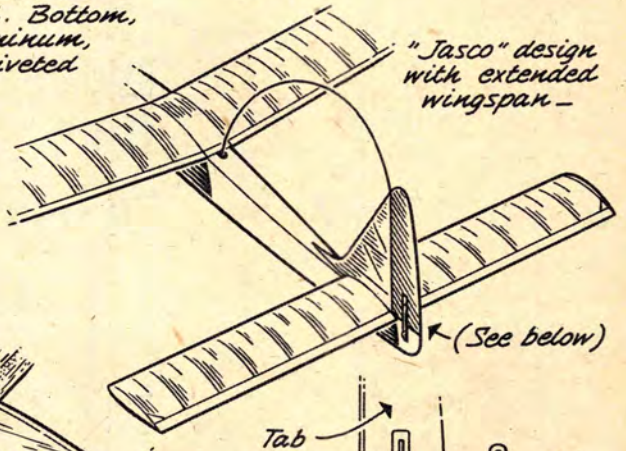
at the Nationals



Paul White, Monrovia, Calif., made light functional team racer cowl of dural. Bottom, of softer aluminum, is bolted or riveted in place —

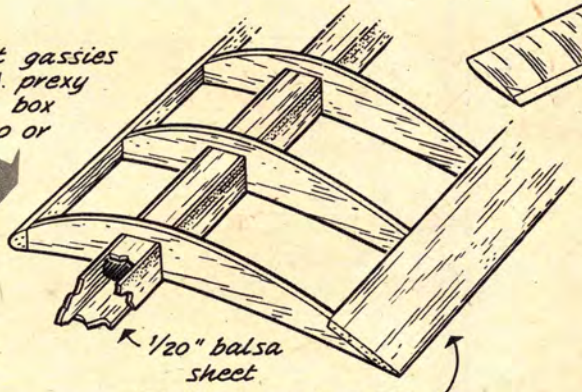


Bill Spawr, Compton, Calif., spot-cemented ping pong balls to stab tips for floats... Main float at front —



"Jasco" design with extended wingspan —

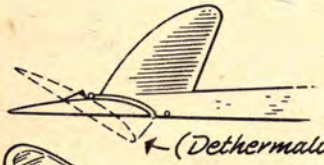
(See below)



Finely built freeflight gassies flown by former A.M.A. prexy C.O. Wright employed box spars (larger jobs two or more) for lightness

1/20" balsa sheet

"Rudderbug"-type T.E.



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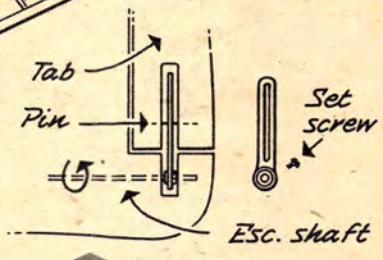
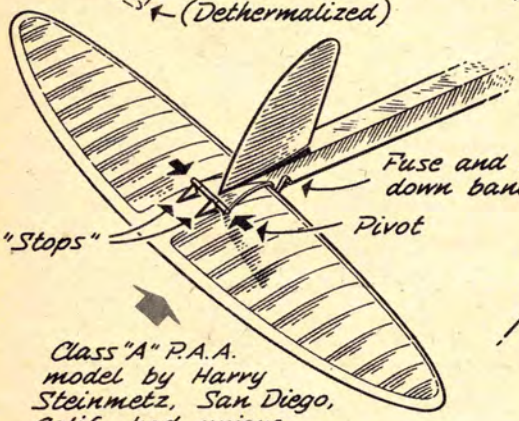
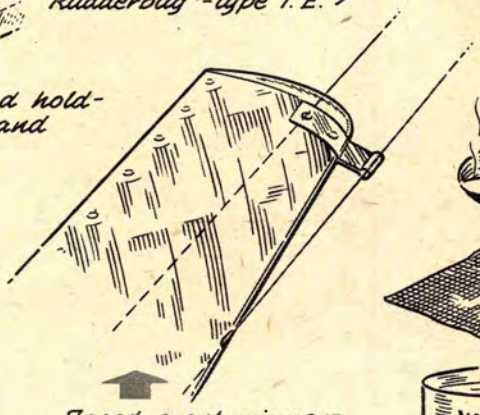


Unusual antenna and inset rudder tab control device on lone sailplane entered in radio event — Built by Edw. Phillips



Class "A" P.A.A. model by Harry Steinmetz, San Diego, Calif., had unique pivoting stab. dethermalizer —

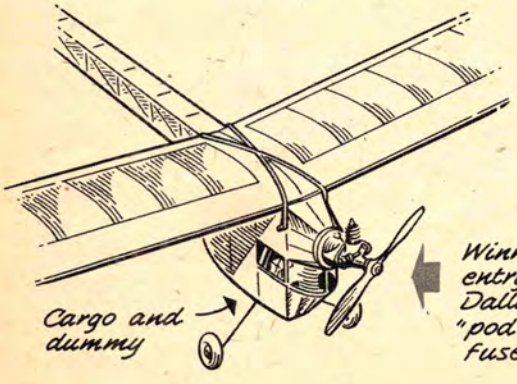


Speed event winners Shiman ('D) and Mueller ('A) decreased yaw effect by moving line guide forward with riveted bracket —

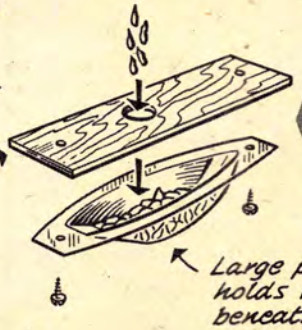
Molten lead...

poured thru screen wire...

into water, makes fairly uniform pellets —

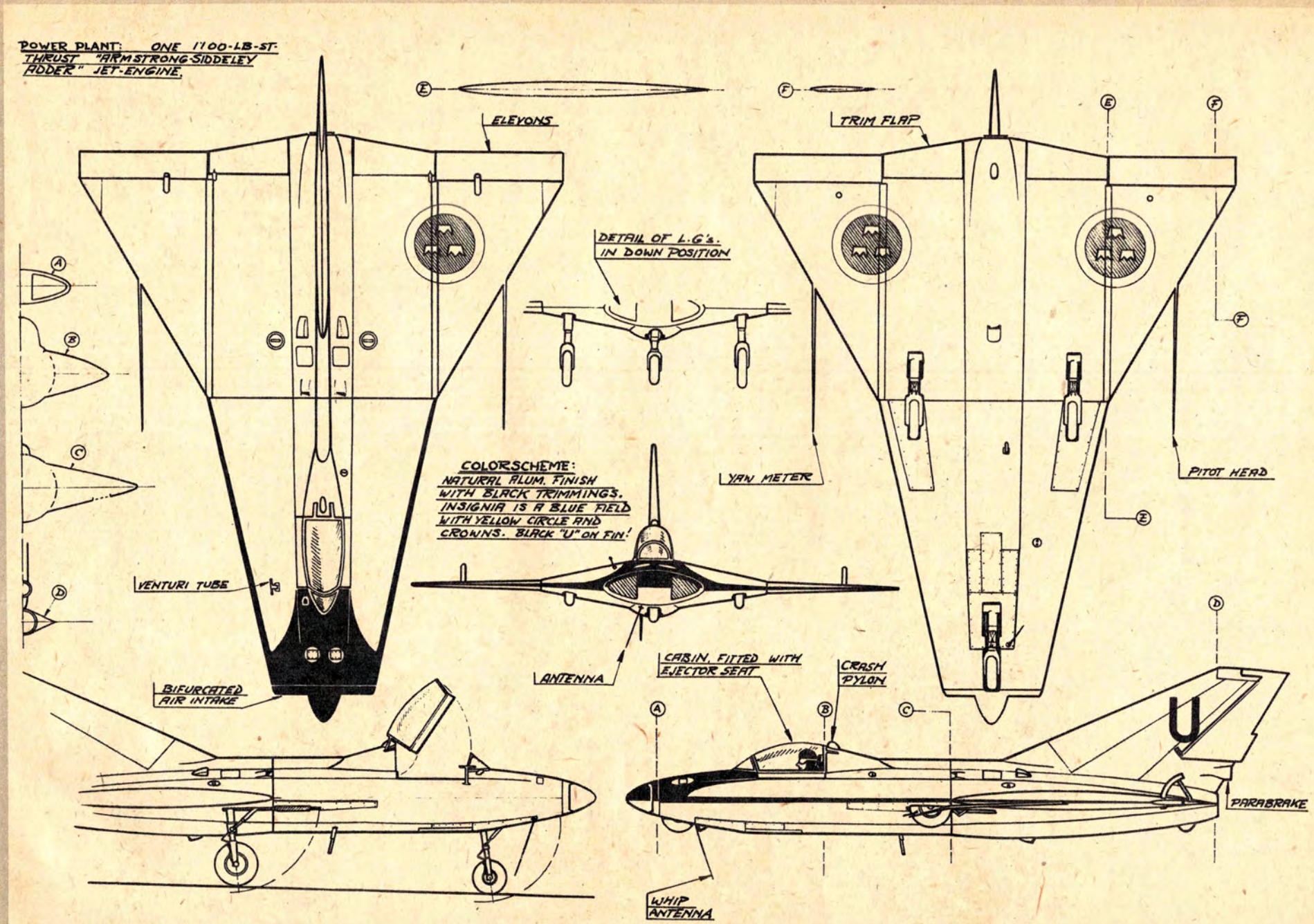


Winning Clipper Cargo entry of R.E. Latham, Dallas, Featured "pod-and-boom" type fuselage design —



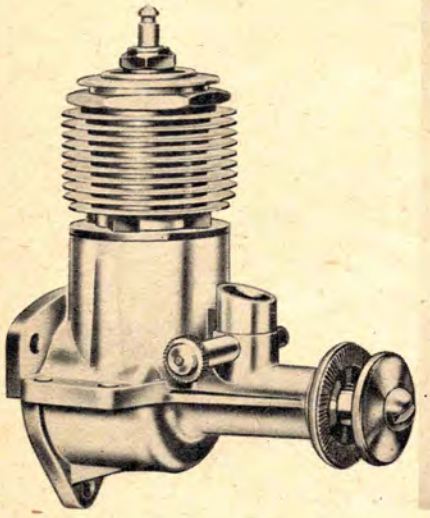
Clipper cargo weight and housing seen at '52 Los Alamitos meet.

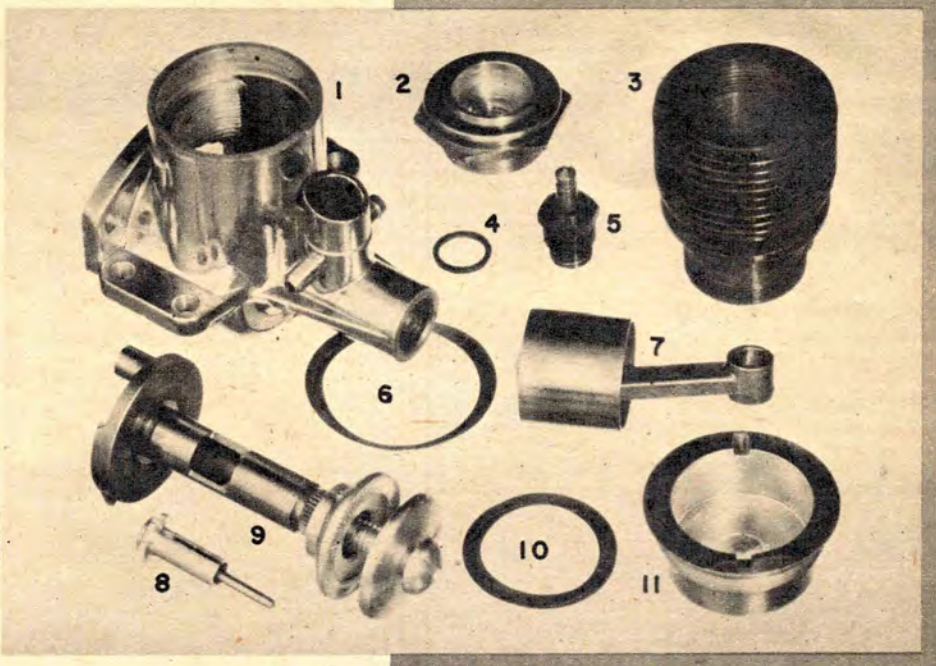
Large plastic canopy holds weight beneath fuselage


POWER PLANT: ONE 11'00-LB-ST. THRUST "ARMSTRONG-SIDDELEY ADDER" JET-ENGINE.
ELEVONS
TRIM FLAP
DETAIL OF L.G's. IN DOWN POSITION
COLORSCHEME: NATURAL ALUM. FINISH WITH BLACK TRIMMINGS. INSIGNIA IS A BLUE FIELD WITH YELLOW CIRCLE AND CROWNS. BLACK "U" ON FIN!
YAW METER
PITOT HEAD
VENTURI TUBE
ANTENNA
BIFURCATED AIR INTAKE
CABIN, FITTED WITH EJECTOR SEAT
CRASH PYLON
PARABRAKE
WHIP ANTENNA

SAAB 210 "Draken"

Scale 3/16"=1' By BJORN KARLSTROM





OK Cub .14

Herkimer carves out a brand-new niche in the engine displacement field with a powerful "inbetween A"

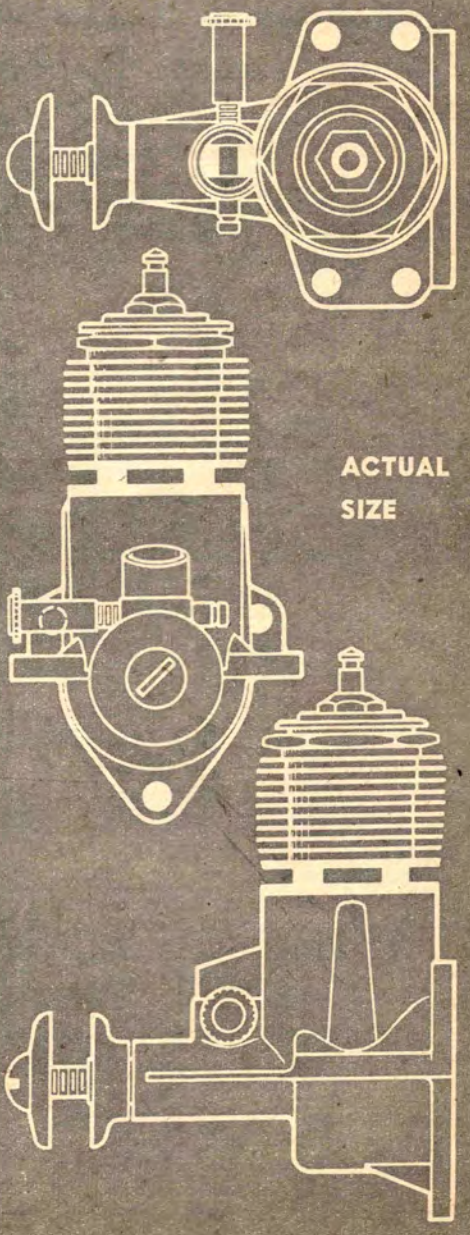
■ The Herkimer Tool and Model Works has built up a sizeable market in producing intermediate displacement engines such as the .074 and .039. Now they have a .149 cu. in. displacement OK Cub right in the middle of the .09 and .19 bracket. This new engine is light in weight and delivers plenty of power. It was designed in particular for glow plug operation of free flight and radio control models, but has all the features that would make it suitable for control line flying.

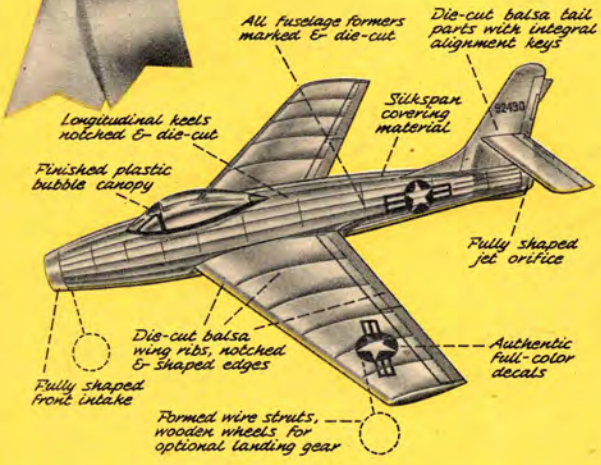
In outward appearance the .14 looks very much like the .049 and .074 and has both radial and beam type mounts. Performance is greatly increased by using a rectangular slot in the crankshaft for the fuel intake. A rectangular slot is also used in the lower part of the carburetor. This combination provides a quick opening and closing action and makes better valve timing possible.

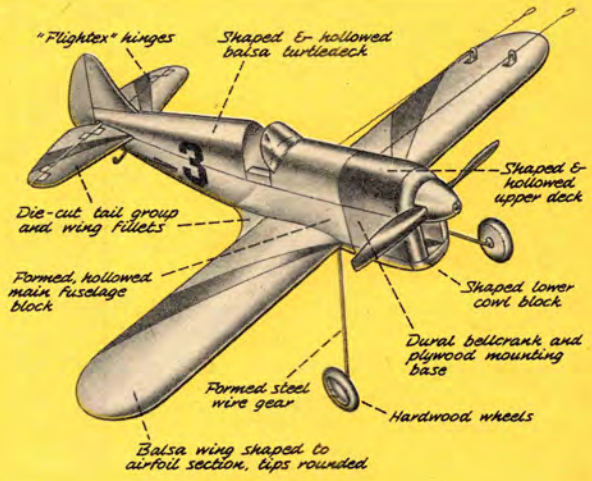
The carburetor has a true venturi shape cast on the inside to improve carburetion. All gaskets are made of soft copper shim stock and provide a permanent seal against leakage. The compression ratio is 8 to 1, which is slightly higher than the former OK Cub models. The head gasket is made up of copper shim .005" thick so that the compression ratio can be adjusted by removing or adding gaskets. The Brebeck patented porting is used in the .14, but there are four intake and exhaust ports rather than the usual three.

Carburetion is greatly improved on the .149 and the fuel level test of 11 inches is outstanding for such a small engine. This has been accomplished by the venturi carburetor, combined with high base compression and large quick-acting rectangular rotary valve. This new rotary valve design also aids in easy starting. The narrow slot makes it possible to have the rotary valve fully closed before base compression starts and remain closed until the fuel charge is compressed and blown through the bypass into the cylinder. This puts more fuel mixture in the cylinder for starting.

The engine was received with a free-fitting piston which allowed for expansion and required very little break-in. The test was started with a one-hour run on OK Glow Fuel as recommended by the manufacturer. Starting was exceptionally easy under all conditions. Holding the finger on the carburetor and turning the propeller once would draw in just enough fuel for the (*Continued on page* 60)




All fuselage formers marked & die-cut
Die-cut balsa tail parts with integral alignment keys
Silkspan covering material
Longitudinal keels notched & die-cut
Finished plastic bubble canopy
Fully shaped jet orifice
Die-cut balsa wing ribs, notched & shaped edges
Authentic full-color decals
Fully shaped front intake
Formed wire struts, wooden wheels for optional landing gear


"Flightex" hinges
Shaped & hollowed balsa turtledeck
Shaped & hollowed upper deck
Die-cut tail group and wing fillets
Formed, hollowed main fuselage block
Shaped lower cowl block
Dural bellcrank and plywood mounting base
Formed steel wire gear
Hardwood wheels
Balsa wing shaped to airfoil section, tips rounded

Cleveland's F-84F T-jet

Latest "Simplex" series includes trio of U. S. jobs

■ Three new additions have recently been made to the line of "Simplex" scale kits marketed by Cleveland Model & Supply Co. (Cleveland 2, Ohio). They are all jets, the McDonnell F-88, Northrop F-89, and Republic F-84F. The latter is the new swept-wing Thunderjet, and is our subject at the moment. This series of kits sell for $1.00 each, and there are nine members so far.

The "T-jet" has a span of 15″, but don't let this fool you, for the model is a big one—the fuselage is 18″ long and the stab projects back. Though Cleveland suggests that the plane be flown by the "high-start" method, that is, through the use of a towline with a length of rubber attached, a smart operator could probably fit in a Jetex engine externally mounted.

The kit is the usual complete Cleveland job; the fuselage is built up on the "former and stringer" system, with the formers held firmly in position by means of top and bottom keel strips. These, and in fact, all balsa sheet parts are on die-cut sheets; outlines of all pieces are inked, so you don't have to search for invisible die-cutting marks to locate the various items. Formers are marked for stringers. Finished hardwood nose and jet outlet turnings are furnished. The ship uses trike gear, and bent wire struts with nicely finished hardwood wheels make this a cinch to install.

The sweptback wing is built up on shaped leading and trailing edges, which are notched at an angle. Spars butt up against the keel for strength, and there is an auxiliary center spar for the same reason. Tail surfaces are of 1/16″ sheet.

The plan is very complete, showing full-size top and side views. Both wings are included, so you can build them right over the sheet.

Covering tissue is a very light but long-fibered grade. You also get a sheet of all required decals, and the extra long plastic canopy that is a feature of Thunderjet design.

Master Modelcraft's Racer

"Small Fry" is Continental-type miniature

■ Another manufacturer has entered the field of Team Racing kits. *Small Fry* by Master Modelcraft (New York 55, N. Y.) is the ideal way to get into the fray, since it is so completely prefabbed that even the novice should be able to construct a successful entrant.

Intended for the engines from .049 to .099, *Small Fry* is a pretty close copy of the general "Goodyear Racer" style of ship. It is a 17½″ span job selling for $2.50.

The sort of kit that almost builds itself, this is the one for *you* if you have tangled lines with some other tyro at team racing, and piled in that plane on which you had spent so many constructional hours.

The fuselage is based upon three main carved balsa pieces—a full-length bottom section, a rear cowl and a nose cowl. All three are fully hollowed, and will require only the briefest sanding to bring them to final shape, after assembly. The open cockpit is braced with side members and there is a celluloid windshield. Motor mounts are beam style and of hard plywood. The engine is installed inverted, which aids in attaining the true scale appearance. The bellcrank mounts on a plywood block; an aluminum bellcrank is included in the kit, as is all other hardware for the control system.

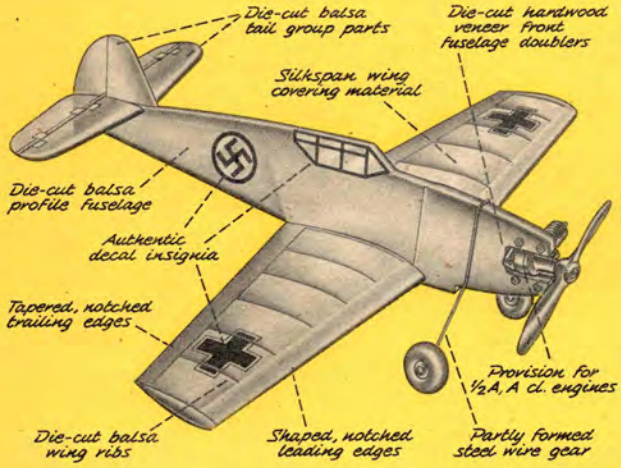
The landing gear is of single strut design—and you get shaped wire and hardwood wheels.

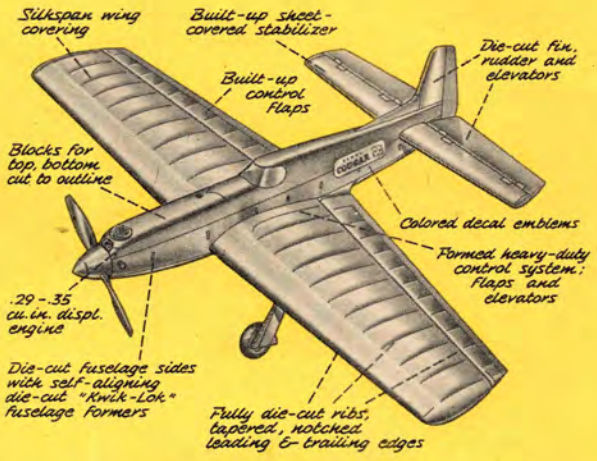
Die-cut balsa forms the tail surfaces, fuselage formers, and wing fillets, all these pieces being of 1/16″ sheet.

The *Small Fry* is a low-wing design, and the wing comes in a single airfoil-shaped piece, about 3/16″ thick at the height of the section. It requires only surface sanding and tip rounding before installation. The airfoil is of the lifting, flat-bottomed type.

The plans are very simple, no scale drawings being required, since everything is cut and shaped to fit. They are exploded-style, and should clear up any doubts that the beginner builder might have.

RIBBON MODELS


Die-cut balsa tail group parts
Die-cut hardwood veneer front fuselage doublers
Silkspan wing covering material
Die-cut balsa profile fuselage
Authentic decal insignia
Tapered, notched trailing edges
Provision for ½A, A cl. engines
Die-cut balsa wing ribs
Shaped, notched leading edges
Partly formed steel wire gear


Silkspan wing covering
Built-up sheet-covered stabilizer
Die-cut fin, rudder and elevators
Built-up control flaps
Blocks for top, bottom cut to outline
Colored decal emblems
Formed heavy-duty control system; flaps and elevators
.29-.35 cu.in. displ. engine
Die-cut fuselage sides with self-aligning die-cut "Kwik-Lok" fuselage formers
Fully die-cut ribs, tapered, notched leading & trailing edges

Messerschmidt by P.D.Q.

Profile flyer is junior combat contender

■ Rugged but light just about tells the whole story of this tiny combat ship by P-D-Q Products Co. (Millville, N. J.). It is one of their series of models designed for the little engines—Half-A and small A—and priced at $1.50. All are profile-fuselage construction; others of the series are the Yak, Jap Zero, Spitfire and Bearcat. P-D-Q calls them "Junior Profile Combat Fliers"; they go together fast and easy.

The *Me-109* has a finished span of 22½", fuselage length of 15", and will weigh about 5 oz. complete with engine. Construction follows quite closely that of the larger combat ships of this manufacturer, which have been presented in this department in past issues.

The fuselage of this little plane is a single die-cut piece of ¼" thick balsa, to the nose of which are cemented two side reinforcing pieces of hardwood. This, plus hard inserts, makes a firm mount for the engine, which is bolted on sideways, beam-fashion.

The elevator is of sheet balsa, with the two flippers held together on a hardwood dowel. A plywood elevator horn is furnished. Sheet balsa also forms the rudder, all these parts being die-cut, of course.

The tapered wing is built up, and consists of six ribs on each side, with solid tips. The leading and trailing edges are cut to shape and notched for the ribs, and are cut almost through at the exact center, so that they may be bent to form the correct tapered shape. Covering is a tough light grade of tissue. The center section of the wing is covered top and bottom with sheet balsa, and houses the bellcrank and its mounting block. The pushrod is external. The wing has a rather thick symmetrical section, as befits a combat ship.

A decal sheet carries German crosses and cockpit cover representation to dress up the finished model.

The plan sheet is very simple and easily understood. Not much in the way of plan is needed, for the manufacturer has already done so much of your work.

Kenhi's Cougar is realistic

Big Class B-C stunt craft from California

■ The growing trend toward more realism in stunt models has received another boost through the introduction of the latest number in the "Cat" series, produced by Kenhi Model Products (Burbank, Calif.). This is the *Cougar*, a big B-C ship with 51" span and total wing and flap area of 550 sq. in. It is intended for engines from .29 to .60, and sells for $6.95. In appearance, it follows the smaller Wildcat and Bobcat and has a distinctly "Mustangy" look.

The fuselage is balsa throughout, with die-cut sides in two parts running the full length of the ship. The upper nose cowling is made removable, forward of the cockpit, allowing access to the tank and engine. The latter is completely closed in, except directly to the front and above the head, to allow for cooling. Beam mounting is used, with long hardwood strips held between two husky hard ply formers. All formers are keyed into the sides of the fuselage for fast, accurate assembly.

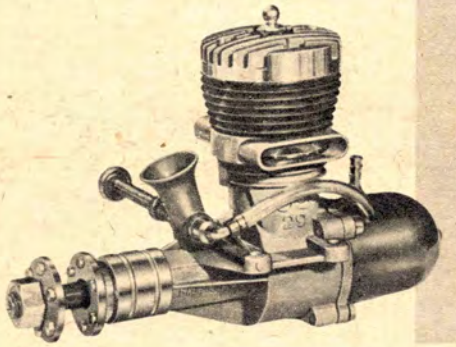
The control system has been designed for use with full span flaps. All control parts are included and the linkage is fully detailed on the drawings. Built-up horns for flaps and elevator (brazed together for real strength—not soldered) are a feature, as is a special bellcrank with a pivot system that insures free operation with no sloppiness.

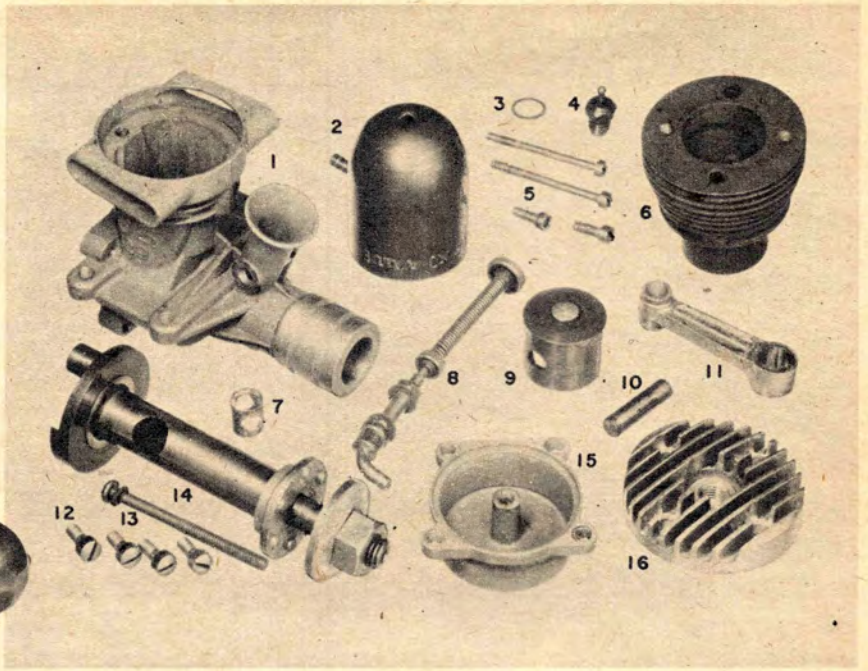
The vertical tail surfaces are of balsa sheet. Stab is built up and sheet covered top and bottom, while the flippers are solid balsa.

The wing is of light but strong construction. All the ribs are die-stamped with cut-outs to lighten them, and allow passage of control wires. Leading and trailing edges of both wing and stab are notched, as are the corresponding flap parts, and all are cut to triangular shape where necessary.

Mention must be made of the very attractive and informative plans, which are in the form of progressive assembly drawings, with exploded sections where needed. A reduced size three-view of the finished plane is also given.

OS "29"





Newcomer to these shores is a .29 disp. glow plug engine high in workmanship and fine details

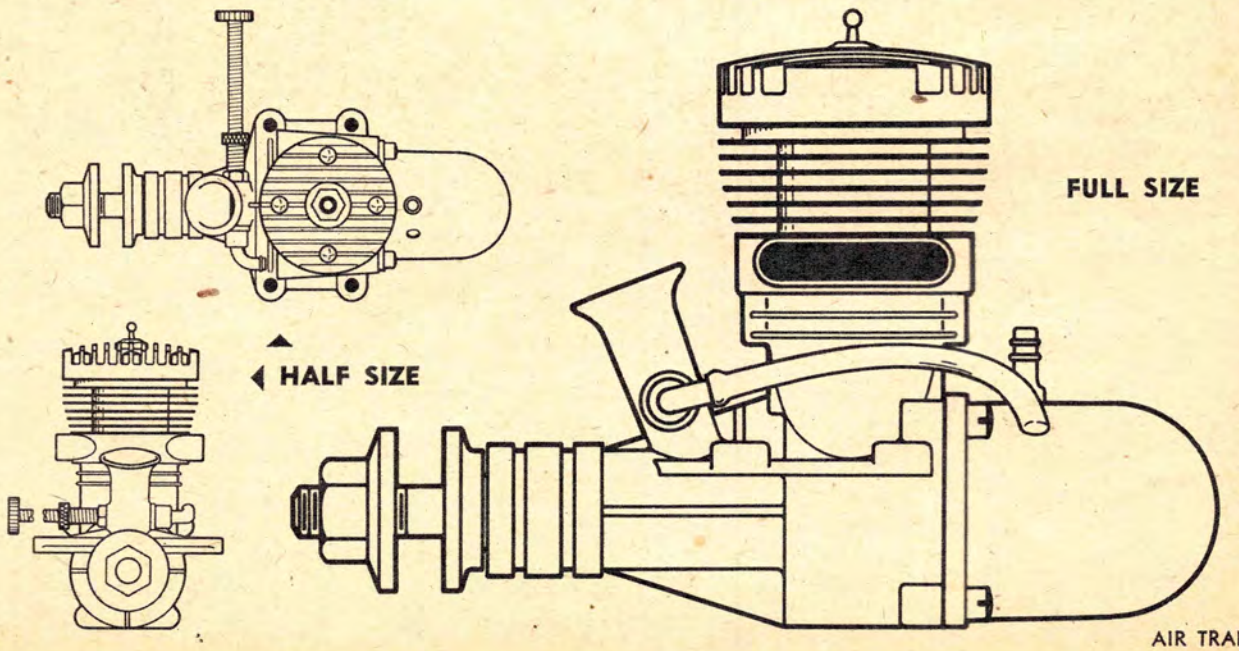
■ The OS .29 engine is built in Japan and distributed in the United States by Atwood Distributing Co. It is a .29 displacement sport type with power output and general performance similar to the current .29 engines produced in the United States.

Most American engines used for stunt and sport flying operate best at approximately 10,000 rpm running on the ground. The OS .29 is ported for higher rpm and delivers equivalent power at a "working" rpm of 12,000. This engine should be well suited to stunt flying and general sport applications due to its ability to feed fuel evenly. Team racing fans should be interested in the 18,500 rpm combined with easy starting, either hot or cold.

The instruction manual supplied with the engine recommended four different fuel mixtures, giving formulas for each, and special glow plugs. However, the engine test was conducted using popular American fuels with Ohlsson and Champion glow plugs and showed very good results. Modelers wishing to operate gas-powered models in areas where prepared fuels are hard to obtain should be interested to know that one fuel recommended by the manufacturer is made of one part castor oil with three parts alcohol. A special glow plug is recommended with this mixture, but equivalent results should be obtained by using an Ohlsson AA plug or one of the glow plugs designed for Half-A engines.

The general appearance of the OS .29 is typical of foreign items imported in this country: very neat workmanship and attention to fine details. The beam motor mounts are quite generous and are slightly above the center of the shaft. A long crankshaft and main bearing move the propeller out a good distance ahead of the needle valve, protecting the fingers during adjustments. The carburetor is of the front rotary type with a very large bell mouth venturi. Generous cooling surface is provided by a large cylinder head and large fins on the upper part of the cylinder.

Material and workmanship inside (*Continued on page* 53)



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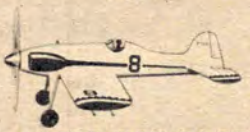

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"AT" FORUM

Got a question or comment? Here's the spot to air your opinions, gripes, suggestions. Questions will be answered by Air Trails' Experts Advisory Board

C. G. on U-controls . . . I have read various articles etc., on the proper location of the C. G. but in every case it pertained to monoplanes. I am building a 4½ ft. model of the S.E.5A from plans scaled up from those in January 1948 Air Trails. Judging from other U-control bipes and the location of the bellcrank therein, it would appear that the C.G. is somewhere in advance of the leading edge of the lower wing.

T. G. Williams, Deep River, Ont., Can.

• Regardless of the amount of stagger, balance point should be at 25% of total chord or slightly ahead. Bellcrank pivot point should be behind C. G. at about 30% of the total chord. Keep bellcrank closer to lower wing than upper wing, slightly below the C.G.

Control-line Flutter . . . I have a Warrior, powered by a Sportsman .29. During maneuvers such as vertical eights, loops etc. it flips very stable, but the second the controls are neutralized and it assumes level flight, a terrific flutter occurs. It appears to be in both the elevator and flaps. Everything seems in alignment and tight. I increased the pushrod to 3/32" landing gear wire, and I've checked the hinges for loose play. It has me stopped and everyone else I've asked about it.

What do you think?

Albert E. Weber, Ashaway, R. I.

• Fluttering of flaps and elevators on a control-liner can be caused by several things:

A harmonic vibration of the control system with the engine vibration is probably the most common. The cure isn't always easy: install another engine! Try different propellers and make sure that props are carefully balanced. Make sure engine is tightly bolted down.

Another cause may be in loose control linkage. All pushrods should have proper fairleads along their length so that they will not whip from engine vibration. If vibration shows up in line leads in wing and flying wires, this is probably the cause.

The last cause may lie in the airflow over the flaps and elevators. When up or down the flaps may set up enough turbulence in the air to blanket and buffet the elevators, which in turn, because of control connection, vibrate the flaps. Suggest try flying the model with flaps control disconnected and flaps firmly anchored in neutral.

Glow Plug Check . . . For the last year and a half I have been using Auto Lite glow plugs and have found them very efficient. The plugs are given to me by a friend who works for the Auto Lite Co. I am sending you one of these glow plugs, so that you can use one for yourself. If it is at all possible, I would appreciate your sending any information about this plug that you can, such as type, specifications, and so forth.

Jack Collins, Toledo, Ohio

• The Auto Lite glow plug that you sent is not on sale in the hobby shops in this part of the country. This plug should fall in the hot end of the list due to the large diameter cavity of the coil. The wire is comparatively large in diameter and should give good plug life. The glow plug washer is of special interest. It is made of two rings pressed together with an asbestos core. This is the first washer of this type we have seen for a quarter inch glow plug.

To Remove Fingerprints . . . Every time I touch my Stinson scale controliner my fingerprints stay right on the finish, and they won't wipe off. Could you tell me how to get them off?

Colin Powers, Ashland, Oreg.

• It is very difficult to keep finger moisture off model finishes. The model should not be handled until it is thoroughly dry. Some dopes may seem dry to the touch but the layers underneath take a few days to really set hard. When the dope is dry and hard, clean the model thoroughly with Simoniz cleaner and give it a coat of wax (Simoniz). Fingerprints can be wiped off the wax easily with a dry cloth.

See September 1951 Air Trails, P. 30, "Finishing Your Model" for additional information.

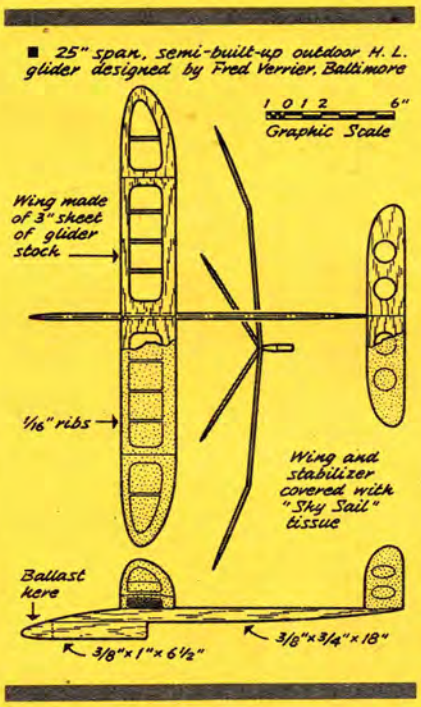
Prop for AD-2 . . . I am interested in your Navy carrier model. I was wondering if you could give me some information about the prop you used on the model (in the photos it's a 4 blader). I'd like to know what size it is.

B. Michon, Chicago, Ill.

• The 4-bladed propeller shown on the AD-2 is strictly for display purposes. It is not used for flying. A regular Top-Flite 12/8 prop is used with the O&R .60 engine for all flying.

The 4-blader is made up from two old props cut down to 11¾" diameter (scale size). The hubs are notched ½ way through so that the props join flat.

We do not recommend 3 or 4 blades for model flying because they do not seem to be as efficient as 2-bladers; they tend to rap knuckles when starting, and are difficult to balance because of varying wood densities.


■ 25" span, semi-built-up outdoor H. L. glider designed by Fred Verrier, Baltimore
1 0 1 2 6"
Graphic Scale
Wing made of 3" sheet of glider stock
1/16" ribs
Wing and stabilizer covered with "Sky Sail" tissue
Ballast here
3/8"x 1"x 6½"
3/8"x 3/4"x 18"

Starting Troubles . . . Is there any Canadian organization to compare with the A.M.A.? What is their address? I believe there was one started last fall but I have not been able to locate it.

What is wrong with a K&B infant engine which fails to pop all the way over during starting? There is a loss of power and sometimes while starting it you have to turn the prop a bit to let the exhaust out. I have used a Testors Infant prop, O&R #2 fuel, have kept the engine clean and covered when not in use and never had any crashes.

What new developments have taken place in the Channel Wing field? Your magazine is the only one and the only way I can find out about this plane.

I live about 50 miles north of Toronto. There are no clubs here, in fact the only other boy interested in modeling is a boy I am teaching to build models (airplanes), so your mag is the only connection with the model world.

How should you rig up a K&B Infant engine for counterclockwise control line flying? In stunt flying, what did you use for a gas tank on the Infant (Aug. '49 A.T.) Vagabond? Did you remove the original tank? How did you fill the tank and adjust the needle valve on this model?

Jamie Huntly, Sutton West, Ont., Can.

• Yes, there is an AMA-like organization in Canada. It is the Model Aeronautics Association of Canada. Its address is 545 Josephine Ave., Windsor, Ont.

Infant engines usually start with pretty heavy prime. Your trouble sounds as if you may be overpriming. One or two drops of fuel squirted into the cylinder on top of the piston will usually suffice. Another difficulty may be in a partially burned-out glow plug or too much voltage on the plug. Use 1½ volts (2 dry cells in parallel) only, and try a new plug. Check by looking in exhaust ports to see if plug is lighting up properly. You can see a glow on the cylinder walls and piston top. If the engine has been overprimed, turn prop so piston is down and exhaust ports are open. Apply boosters to plug and let engine sit about 10 seconds. You will be able to hear a slight frying or crackling sound which means that the fuel and oil are being burned out of the glow plug, allowing it to function properly again.

Try a litle larger propeller: the extra weight will help the engine follow through when starting. Once you know the starting combination and the engine is broken in you can again use the smaller prop. Slight adjustments in throttle settings for different props are usually needed.

Try different fuels—usually the hotter types work best in the Infants. O&R AA, Power Mist Infant, Thimble Glow Fuel and Thimble Drone Fuel are some to use.

We have no further information on the Channel Wing other than what has appeared in Air Trails.

Installing the Infant is covered on page 91 of Air Trails August 1949. The original tank can be used if straight flying is to be done. If stunt flying is to be done a small wedge tank should be used and the regular tanks removed. Servicing the engine and tank on the Vagabond is accomplished by removing the cowling and replacing it when engine is running and tuned in.

Balsa Sizes . . . I have been a modeler for ten years with kits. The other day I decided to build the Consolidated PB-2A in an old issue of A.T. The plans were very easily blown up to scale, just a projector scope being needed.

Now after writing several hobby supplies I find the balsa wood or about 70% of the entire ship is special cut sizes. This is my beef. You list in the ad sections various jobbers. Still they can't supply. What's the use putting a perty thing like the PB-2A in the magazine to entice a poor guy with when the wood can't be found?

A. C. Turner, Dublin, Ga.

• In view of the fact that your past experience deals only with kit models, perhaps you are not familiar with the fact that wood is generally sold in 36" lengths and on rare occasions in 24" lengths. Perhaps you thought that you could purchase wood in the specific lengths mentioned. This is not so. These lengths are specified only for the builder's convenience to scan his wood supply to see if he can use any wood left over from his last model.

If you cannot purchase these sizes locally, write to Junior Aeronautical Supplies Company, 203 E. 15 Street, New York 3, N. Y., for their catalogue and price list on wood supplies. Should you find it difficult to obtain certain thicknesses it is permissible to laminate two sheets to attain the correct thickness. For example: one ¼" x 3" x 10" plus one ½" x 3" x 10" could be cemented together to produce a ¾" x 3" x 10". Easy?

Another wood supplier is Sig Mfg. Co., 102 Main St., Montezuma, Iowa.

(*Continued on page 79*)

OS "29"

(*Continued from page 50*)

the engine indicate good resistance to wear. The steel crankshaft is hardened and ground to close tolerance. Double intake and exhaust ports are cut in each side of the steel cylinder, and fins are machined integral. The piston is made of cast iron with a safety plug fitted into the top that will melt if the engine overheats. The base of the engine is designed to be very compact and give a high base compression.

The engine porting is unusual for a .29 engine. Fuel moves from the base through a bypass on each side of the cylinder through two intake ports and into the combustion chamber. Exhaust ports are directly above the intake ports and discharge out of each side of the engine.

Performance was very good during the first part of the test, but continued running showed an increase of 1,000 rpm and reached a constant in about five hours. Starting was easy at all times with the engine either hot or cold. The needle valve adjustment was very good at all speeds and the engine ran smooth throughout the full range. At 10,000 rpm the power output was only slightly less than that of the best American engines, but came up to a most favorable comparison at 12,000 rpm. This is probably due to the exhaust port opening sooner on the OS .29.

This engine is produced by a company that is twenty years old and has put sixteen different models on the market, over thirty thousand engines having been produced. They also make an .09 and .19 engine which is expected to be available in this country.

All screws and threads are interchangeable with U. S. parts except the propeller nut. This is an odd thread and care should be exercised when changing propellers on the flying field, since replacements can be obtained only through parts service.

Parts Illustrated

1. Crankcase: die-cast aluminum, 1.76 oz. 2. Fuel tank: aluminum, 1⅛" dia. x 1⅜" long, .17 oz. 3. Glow plug washer: copper, .032" thick. 4. Glow plug: steel, ¼-32 thread, .10 oz. 5. Cylinder head bolts: steel, 5-40 N.C., .15 oz. 6. Cylinder: steel, .740" bore x 1⅜" long, 1.53 oz. 7. Carburetor bushing: brass, .230 bore, .03 oz. 8. Needle valve assembly: brass and steel, .26 oz. 9. Piston: cast iron, .740" dia. x 9/16" long, .27 oz. 10. Wrist pin: steel, .197" dia., .06 oz. 11. Connecting rod: aluminum alloy, 1 7/32" long, 11 oz. 12. Rear cover bolts: steel, 5-40 N.C., 11 oz. 13. Gas tank bolt: steel, 5-40 N.C., .06 oz. 14. Crank shaft: steel-hardened and ground, .436" shaft, .266" dia. pin, 1.37 oz. Drive washer: die cast aluminum, ⅞" dia., .10 oz. Front washer: die cast aluminum, ⅞" dia., .09 oz. Propeller nut: steel, International metric thread—8 mm. dia. x 1 mm. pitch, .13 oz. 15. Back cover: die cast aluminum, .25 oz. 16. Cylinder head: Die cast aluminum, 1 15/32" dia., .50 oz.

Engine Data

Performance. Bare weight: 6.9 oz. Propellers: 10/6 wide blade wood: 9,300 rpm. 9/6 wide blade wood: 11,800 rpm. 9/6 narrow blade wood: 13,000 rpm. 7/9 wood: 15,100 rpm. 7/4 plastic coated wood: 18,300 rpm. Fuel: Test run on American fuel. Fuel level test: 18" at 11,800 rpm, 24" at 10,000 with venturi sleeve.

Design Data. Displacement: .293 cu. in. Class: B. Bore: .740 in. Stroke: .680 in. Stroke bore ratio: .92. Compression ratio head: 7.0. Compression ratio base: 1.43. Port area intake: .062 sq .in. Bypass: .120 sq. in. Exhaust: .125 sq. in. Ignition: Ohlsson racing and Champion used in test.

Construction Features. Bearings: Crankshaft: bronze. Crankpin: bronze. Wrist pin: aluminum. Double bypass and double exhaust ports.

Next Issue!

The brightest new free flight design at the Nationals! It's the "Amazon 400" designed by Sandra and Stan Hill and flown by Jack Smith to a 1st place on its test hop.

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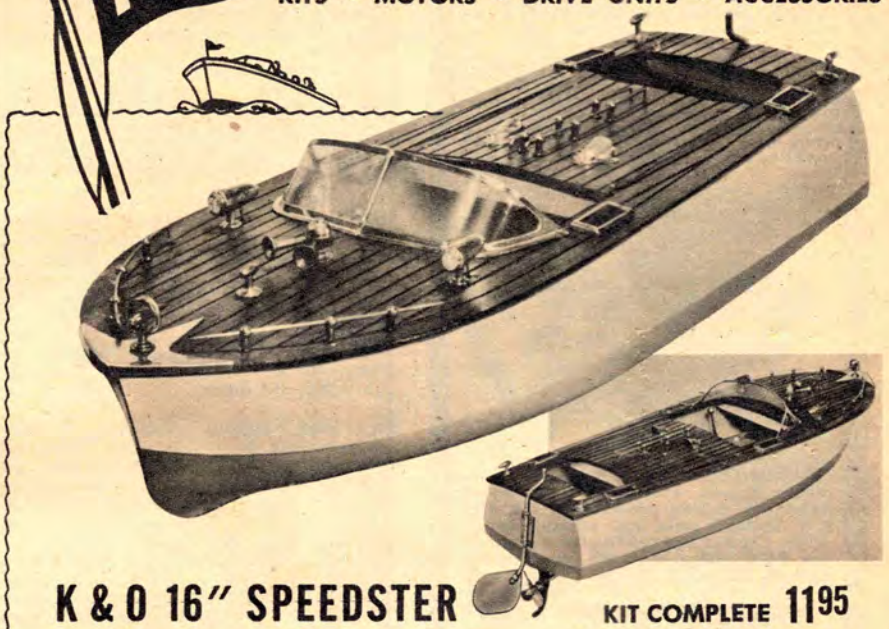

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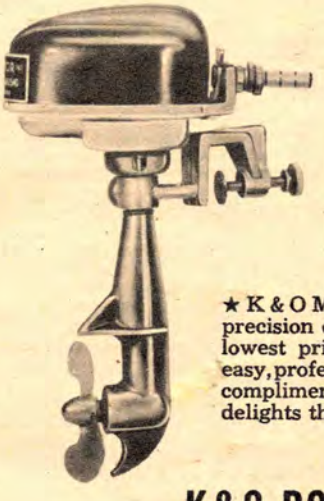
A BEAUTY! Easy to assemble—easy to operate. Perfectly detailed and complete in every respect. Hull is equipped with large size Electric Drive Unit, two Electric Headlights and many other beautiful nickel-plated fittings. Finish-carved hull and deck. Four flashlight batteries power electric motor giving speeds up to 9 mph. Rides the water like its 30-foot inboard prototype.



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OUTBOARD MOTOR $3.50

Sturdy, powerful, dependable—in attractive red and aluminum. Operates on 3 to 9 volt flashlight or dry cell batteries. 4⅝" high—weighs approx. 4 ounces. Many boats, like Aqua Pal, Runabout, etc. were designed for this staunch little motor.

★ K & O MODEL BOATS AND SUPPLIES feature finest precision quality, perfect detail, parts completeness and lowest prices. K & O Simplified Kit Assembly assures easy, professional results for the novice. K & O equipment compliments the skillful, exacting craftsmanship that delights the expert.

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ANOTHER FIRST! The new E.D. ARISTROL FREE BAND "BOOMERANG" radio control receiver, transmitter and escapement. Not just another set but completely redesigned electronically and physically. Not a kit! All factory built, factory adjusted, pre-tested AND COMPLETELY WIRED—READY TO INSTALL IN YOUR PLANE OR BOAT. NO SOLDERING—All components (Receiver, Escapement, Switch, Plugs and Sockets) are pre-assembled—just attach 4 wires to battery supply . . . it is just that simple! No increase in price. **$52.90**

A. TRANSMITTER: 3A4 tube giving greater radiation than any other CRYSTAL controlled transmitter. Entirely self-contained including 8 ft. sectional aerial and extension keying switch. Checked and stabilized to conform to new F.C.C. ruling of ±.04% on frequency. Batteries 135 volt & 1.5 volt. **$29.50**

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B. Standard "Boomerang" Receiver unit now fully cabled to escapement, plugs, sockets, switches, and rheostat. Just install and fly. Special "5 lives" tube circuit gives 5 times normal tube life. New polarized relay gives positive contact under all conditions. Special antenna coupling makes even short aerials sensitive. (No need to increase battery voltage — a practice which materially lowers the tube life.) Specialized controls can be used because all three relay contact connections have been wired to sockets. Plug in for special controls is included. Weight 1.9 ozs. Batt. 45V and 1.5V. Price includes escapement and all switches, plugs, sockets, etc. WIRED AS A UNIT, READY TO INSTALL, NOT A KIT! **$25.95**

C. ESCAPEMENT: 100% reliability due to robust and accurate construction of claw and rotor. Special double winding and current-saving device increases battery life, a feature first developed by E. D. Weighs only ¾ oz. Uses 3 pen cells. **$5.95**

HARD TUBE RECEIVER PACK

D. "BOOMERANG" HARD TUBE RECEIVER has same characteristics of standard "Boomerang" unit except for higher voltages necessary. Special polarized relay is used and specialized controls can be added. Weight 3½ ozs. Price includes escapement and all switches, plugs, sockets, etc. WIRED AS A UNIT, READY TO INSTALL, NOT A KIT! **$26.95**

REED UNIT — Supplied in three different frequency ranges which, when combined, will give up to nine channels. Diagram of suitable transmitter and receiver also supplied to enable construction of own equipment. Weight 1½ ozs. **$19.95**

Postage & Ins. 50c

COMPACT ESCAPEMENT

— For use in small craft. Size: 1 x 1⅛ x 1⅛; Weight: ¾ oz.; Voltage 3 to 6 volts.

POLARIZED RELAY — Polarized by high flux double magnet system and incorporates fully balanced leaf armature. Unaffected by vibration and capable of operating on current changes of under 1 m/a. Weight ⅞ oz. **$7.50**

Standard Relay $6.50. (not shown) Postage & Ins. 25c

$5.95 Postage & Ins. 25c

Postage & Ins. 25c

CLOCKWORK ESCAPEMENT

— Ideal for marine use, self powered with an enclosed spring wound motor. For 2 or 4 position operation. Weight: 3 ozs. **$11.50** Postage & Ins. 50c

POLK'S ARE RADIO CONTROL HEADQUARTERS. All leading brands of sets, tubes, and accessories in stock.

DEALERS: ONE STOP ORDERS FOR ALL R.C. STANDARD DISCOUNTS!

POLK'S MODEL CRAFT HOBBIES, Inc.
314 5th Ave. (32nd), Dept. AT-153 NYC 1

R/C Buyer's Guide

(*Continued from page* 39)

and many other R/C components. Radio Control Headquarters—2-arm escapement. Rockwood Radio Controls—motor-driven actuators. George Sweet, 549 McKinley Ave., Beloit, Wis.—proportional control actuators.

All motors made today can be used for R/C, but there are a few of special interest in addition to the K&B listed above. New OK .14 is ideal for this use. Mills .08 diesel with throttle (Polk's) is fine for small planes fitted with engine speed control.

Batteries: It is best to buy these locally as they are widely distributed and available everywhere. Such brands as Burgess, Olin, Eveready, make both A and B batts of top quality. Other brands like Bright Star and Rayovac supply flashlight cells that are widely used in R/C. Small B batts, generally used with receiver, can always be had from concerns that cater to hearing-aid users.

Parts and Supplies: Following concerns are generally known as radio "wholesalers" and sell both over the counter and by mail; all of them supply free comprehensive radio catalogs: Allied Radio, 833 W. Jackson Blvd., Chicago 7, Ill. Burstein-Applebee Co., 1012 McGee St., Kansas City, Mo. Newark Electric Co., 323 W. Madison St., Chicago 6, Ill. Radio Shack Corp., 167 Washington St., Boston 8, Mass. Radio Wire Television Inc., 100 Sixth Ave., New York 13, N. Y. (also branches in Newark, N. J., Boston, Mass.). Terminal Radio Corp., 85 Cortland St., New York 7, N. Y.

And there are many other such concerns located all over the country.

The following carry various special items needed in R/C work: Electronic Specialty Supply Co., 58 Walker St., New York 13—relays, power supplies, meters, crystals, tubes, etc. Ronald Eyrich, 1219 W. Meinecke Ave., Milwaukee 6, Wis.—all sorts of alnico magnets. Heath Co., Benton Harbor, Mich.—low-cost kits for high-grade radio test equipment. Indiana Steel Products Co., Valparaiso, Ind.—alnico magnets. Leotone Radio Corp., 67 Dey St., New York 7—midget transformers, headphones, alnico magnets, switches, etc. Relay Sales, 833 W. Chicago Ave., Chicago 22—all makes and types of relays.

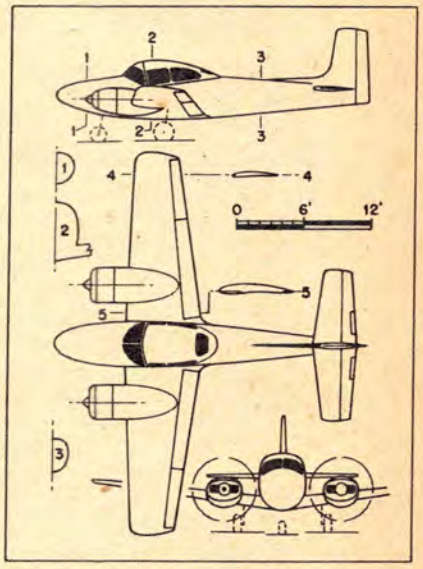
R/C Plane Kits: There are countless kits on the market that may be converted to good R/C flyers but the makers listed below supply kits of planes *expressly designed* for R/C use: Berkeley Model Supplies—Brigadier 38, Super Brigadier (58" span), Bootstraps "A-RC" (54" span), Buccaneer C Special (72" span), Custom Cavalier (108" span), etc. DeBolt Model Engineering Co., Williamsville, N. Y.—Live Wire (48" span), Live Wire Senior. Junior Aeronautical Supply Co., 203 E. 15 St., N. Y. 3—R/C Master (49" span), Thermic 100 glider (100" span). Sterling Models, 1530 N. Hancock St., Philadelphia 22—28" Chris-Craft boat model kit.

R/C Books: American Radio Relay League, West Hartford, Conn.—"Radio Amateur Handbook," "Radio Amateur License Manual." (These are not specifically on R/C, in fact they don't mention the subject, but they are invaluable general books on amateur radio, and on all the various licenses available to amateur operators.) "Cal Smith on Model Building" (general model book, but has plans for R/C plane and R/C boat)—Fawcett Publications, Inc., Greenwich, Conn. "Model Control by Radio"—Radcraft Publications, 25 West Broadway, New York 7. "Radio Control for Models"—Gull Model Airplane Co., 10 E. Overlea Ave., Baltimore 6, Md. (Outfit also has book on R/C boat models.) "Radio Control for Model Aircraft"—Polk's. "Radio Handbook" (another general amateur radio manual)—Editors and Engineers, Ltd., 1300 Kenwood Rd., Santa Barbara, Calif. "The Radio Control Instruction Manual" (intended specifically for RCH equipment, but has much valuable general R/C info)—Radio Control Headquarters, Box 178, Belmar, N. J.

The International Radio Control Model Society, founded some years ago in England, issues very interesting bulletins several times yearly to their members; info on membership may be had from the American affiliate, the Pacific Radio Control Society, Box 762, Walnut Creek, Calif. Many of the concerns selling complete R/C outfits have very complete instruction manuals, of interest to users of other makes of apparatus. Some of these may be purchased separately.

Plans for R/C Planes: "Mac's Robot", Air Trails plan #R101; has complete plans on same sheet for 27¼ transmitter and receiver, and for Beep Box. "Rudderbug" plans may be had from Gull Model Airplane Co. or from Control Research. "Susie IV", 60" span, 594 sq. in. cabin mono with trike gear; will carry 32 oz. of R/C equipment, and plans may be had from Premium Mfg. Co., Box E, Puente, Calif.

BI-NAVION



A customized version of the popular single-engine Navion for those who want twin-engine safety for bad weather flying with the fine flying qualities of the standard Navion. Makes an excellent executive transport. Main changes consist of general beefing up to take two 140 hp Lycoming engines, extension of the nose and 18-inch increase in height of fin and rudder for single engine operation. Cost of conversion in the neighborhood of $20,000. A number of twin Navions are already on order.

Plan R/C Set-up

(*Continued from page* 39)

is available from the factory fitted with dual needle valves, especially to go with this escapement. The combination gives motor two-speed or motor cut-off at will.

The Citizen-Ship (often called Macnabb, after the maker) receiver requires more A battery power than most others, but is very easy on the B batt; the five series-connected medium cells shown will give long life.

For those who like the midget planes (though it will work equally well for big ships), you can use the Super-Aerotrol receiver on the 27¼ mc. band (no license band required here, or for 465 mc. band, but you can't build your own transmitter on the latter). A Super-Aerotrol escapement is linked to the rudder. This sort of set-up has been used with success on true

Half-A planes fitted with .049 engines, but the novice would be wise to use something a bit larger, and power it with an engine about the size of the .099 Cub we have employed here.

Note that a meter jack is included in this mock-up, as in the Citizen-Ship but in addition we have a potentiometer, a necessary accessory for gas tube receivers, of which this is a good example.

Dyna-Jet

(*Continued from page 35*)

proprietorship—Aeromarine factory. He took the engine and demonstrated it to many model plane engine manufacturers. They were interested, but not to the degree that Tenney wanted. He decided to build the engine himself. Mass produce it. Sell it to model builders for jet-powered planes.

Aeromarine took on a couple of assistants; two other shop workers. It turned out a batch of 50 of the engines. They all worked perfectly. The little company was ready to do business. Then disappointments struck it down, almost closed its doors before it ever got started. There was a whole series of setbacks. First off, model builders turned skeptics. They didn't think you could build a plane around the engine. It would burn up anything you might try to do in putting wings on it. (This had already happened in previous attempts at jet-powered models.)

That's when Tenney found himself in the model design and model manufacturing business. If the model builders wouldn't accept his power plant and apply their own ingenuity to building plane designs for it, then he'd show them it could be done. He turned to a friend at Wright Field, Joe Fallo, who builds models for the Air Force. Together they collaborated on a design. It was a little crude, a big wide-winged affair, but it worked.

Joe flew it one day in the spring of 1946 from a vacant field not far from the "factory" garage. It took off wth a swoosh, flew around a couple of times on its control line, then splattered itself all over the ground. Like so many crashes they blamed it on "pilot error." A second experimental model worked with a great deal of satisfactory performance.

It was true, the first jet-powered pulsejet model planes that Fallo and Tenny built were wing and stick affairs. That wouldn't entice many model builders used to sleek, trim, scale models. So, they put the engine in a plane that looked like the X-1 and in another that looked like the F-80 Shooting Star. And they took them around the countryside to model meets and proved the little engine was a power-house. The sky looked bluer.

A survey of the potential market indicated that they could sell "at least 10,000 the first year."

Dyna-Jet loomed like a dynasty.

The model builders of the country were promised a jet engine by late summer. They didn't get it that quick. Something got stuck in the tailpipe. Tenney, to meet anticipated production, tried "farming out" certain parts to other companies. The stuff didn't come back with suitable accuracy. Other parts weren't available. Most important, the technique of welding the very thin stainless steel tube for the tailpipe turned into a technical tragedy. On a batch of 100 engines the welds didn't hold. Something had to be done and quick.

Marks came to the rescue. In face of many "doubting Thomases" he devised a special machine using plain gas welding which did the trick automatically. And the welds withstood the terrific 1800-degree F. temperatures! This machine is still turning out Dyna-Jets. It is one of the production secrets.

Demonstrating one of the jet-powered model planes at a meet in Indianapolis, Tenney was approached by an observer who asked: "How do you weld that thin stainless steel tube?"

"We gas-weld it," he explained.

"Impossible," said the stranger. "I work at Allison. We make jet engines, too. The thinnest we can weld is down to 20,000th of an inch; and that stuff of yours. . . . It

VECO PRODUCTS

SCORES AGAIN!

THE VECO Smoothie

FULL STUNT CONTROLINE CONTEST MODEL

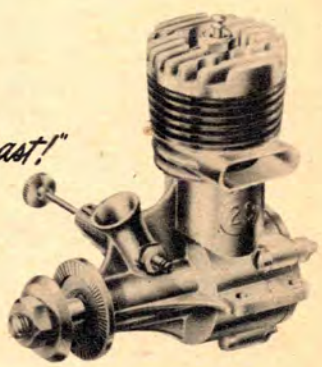
THE ULTIMATE IN PRECISION STUNT FLYING!

Now you may have it, in "easy to build, easy to fly" prefab kit form—the widely recognized, spectacular "Smoothie Stunter" designed by "one of the world's top-ranking stunt designers," Veteran Veco Designer Bob "Smoothie" Palmer. It's big, it's fast, it's a winner! Instant control response, a thrill to fly and stunt. Quality precision parts, simplified assembly. Wing span 52", Wing area 501 sq. in. including flaps. For engines .29 to .35 displacement. Finished weight approximately 32 ounces.

Buy a kit—power it with the unsurpassed..

VECO "29" OR "31" GLOW PLUG ENGINE

"The Champions Boast from Coast to Coast!"



"Powerhouse thrust" with "fuel-miser" consumption, for either controline or freeflight, gives you maximum power and saves you money on fuel. Finest precision engineered parts and workmanship assure dependability and top performance always.

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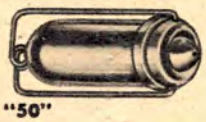
Planes • Engines
Propellers • Wheels
Accessories

TO MODEL MODERN AIRCRAFT YOU MUST HAVE MODERN POWER!

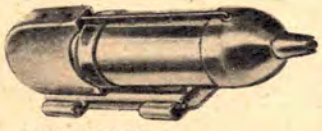
JETEX JET ENGINES

- NO MOVING PARTS — SAFE, CLEAN, SCIENTIFIC
- LOW COST, SIMPLE, EFFICIENT DESIGN
- SOLID FUEL
- TORQUE FREE THRUST OF TRUE REACTION MOTOR
- LIGHT WEIGHT, PRECISION MADE ALUMINUM PARTS

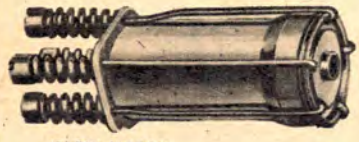
GIVE YOU THESE FEATURES



JETEX "50"



JETEX "150"



JETEX "350"

American Telasco, Ltd., Huntington, N. Y.

SPECIFICATIONS	jetex jet engines		
model	50	150	350
ENGINE WEIGHT	.2 OZ.	.75 OZ.	2.5 OZ.
FUEL WEIGHT (min.)	.2 OZ.	.27 OZ.	.4 OZ.
TOTAL WEIGHT	.4 OZ.	1.00 OZ.	2.9 OZ.
① THRUST (max.)	.6 OZ.	1.75 OZ.	4.0 OZ.
DURATION — one charge	12 SEC.	18 SEC.	12 SEC.
DURATION — two charges	——	——	24 SEC.
DURATION three charges	——	——	36 SEC.
TORQUE	NONE	NONE	NONE
EXHAUST VELOCITY	1200 FS	1400 FS	1400 FS
OVERALL LENGTH	1 5/8"	3 1/2"	3 3/4"
MAXIMUM DIAMETER	11/16"	1"	1 3/8"
EFF. WINGSPAN	12-20"	18-36"	32-54"
② ENGINE PRICE	$1.95	$4.95	$8.95
③ FUEL PRICE	$ .65	$ .95	$1.00

NOTE 1 THRUST OF "150" WITH AUGMENTER TUBE: 2.25 OZ.
NOTE 2 INCLUDES: ENGINE, ACCESSORIES, MOUNTING CLIP INSTRUCTIONS, FUEL
NOTE 3 INCLUDES: 10 FUEL CHARGES, IGNITERS, RETAINER SCREEN, SEALING WASHERS

AMERICA'S FIRST NEW RAM-JET HELICOPTER

Available for the first time anywhere!—scale model of the new, exciting "Hiller Hornet" designed for Army, Navy and Civilians

$2.98
—the complete kit with display stand.

The only book of its kind today!

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by "Les" Morris

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can't be done!"

Tenney's plant today is turning out about 150 jet engines for model planes per month. Gas welding them, too! Another theory is catching up with a new technique.

"Our success seems to be based on the fact that we never were experts," Tenney claims. "We didn't know you couldn't do it."

The yardstick of his company's success, however, isn't measured by its sale of jet engines to model builders. Actually the first year's sale fell far below that survey's "indicated acceptance." It was about 2,000 motors. Altogether they have manufactured approximately 10,000 of the model plane powerplants in the six years since they started. But the motor has grown into other uses; the plant is in many other fields.

Tenney himself sums up what happened very nicely: "With the model plane engine we had a very great scientific success. But it was a financial flop with a capital F."

He admits very frankly the cost ($35) for the Dyna-Jet is that high because of limited production and limited demand. But it has been a powerful little engine to pull a very profitable train of other items resulting in a growing business. But if Tenney got a kick-in-the-pants disappointment over his model engine sales, the small engine has healed any hurt because of the big boot in the brain it gave to a lot of the country's top scientists. What it did to the science of jet engines is what Fulton's *Folly*, the first steamboat, did to doubters when it puffed away so majestically up the Hudson. They wouldn't believe it.

For one thing, scientists look at a jet engine in terms of a trick equation—"lb. fuel/lb.thrust/hr." It means pounds of fuel used per pounds of thrust per hour. The more you can starve an engine's appetite for fuel without cutting down on its thrust, the better engine you have designed.

The German V-1 had a ratio something like this: four pounds of fuel per pound of thrust per hour. The initial Dyna-Jet—a much smaller engine and more difficult to build (the difference between a clock and a wrist watch)—had a 2:6 ratio. It had increased performance fuel-wise by more than 50 percent!

More important, the V-1 had a 20-minute endurance on the life of its hundreds of intake valves. It was just enough to get it into the air, across the channel and down on London. Then, the valve burned out. Tenney's engine had a two-hour life for the single valve. More than that the V-1 fired 40 to 50 times per second, which meant the valve lips were flapping like a bird's wings in comparison to 220 vibrations per second in the Dyna-Jet, a buzz-saw operation. And today's improved little jets have valve life in excess of 50 hours, Tenney reports.

Scientifically, indeed, Tenney had made progress. There was no other jet engine in existence to compare with such performance. Even when engineers from Wright Field came out and saw the small engine perform they could hardly believe it. But they had to admit it was the best progress made so far in the jet (pulse jet) field.

It was this proof-positive of the performance of his small engine that led the manufacturers of the Dyna-Jet into other fields. Finally, they got a contract to build a larger pulse jet engine for the military. Details not available. Security reasons. But they are definitely continuing in this field.

With an eye to commercial business, Tenney and his crew modified the engine and produced what they call the Dyna-fog Jet Insecticide Fog Generator. The Navy and Army are using this now to build smoke screens around their battleships and ground maneuvers! It is also being used in Florida and Texas to provide effective kill sprays for mosquitoes and other insects.

Another project is the application of the jet engines to helicopter rotor blades, bringing the pulse-jet helicopter very close to reality. As Tenney puts it: "All you need is a rotor blade, the pulse jet engine, a seat to sit on and a fuel tank—and away you go." He knows, however, from past experience it won't be that simple. Nothing is.

They have also tested the jet engine for glider boosts to get the sailplanes into the air and eliminate the need for tows and winches.

Experimentally they have tried the engines out on a bicycle with great potential results, and someday there may be a jet-

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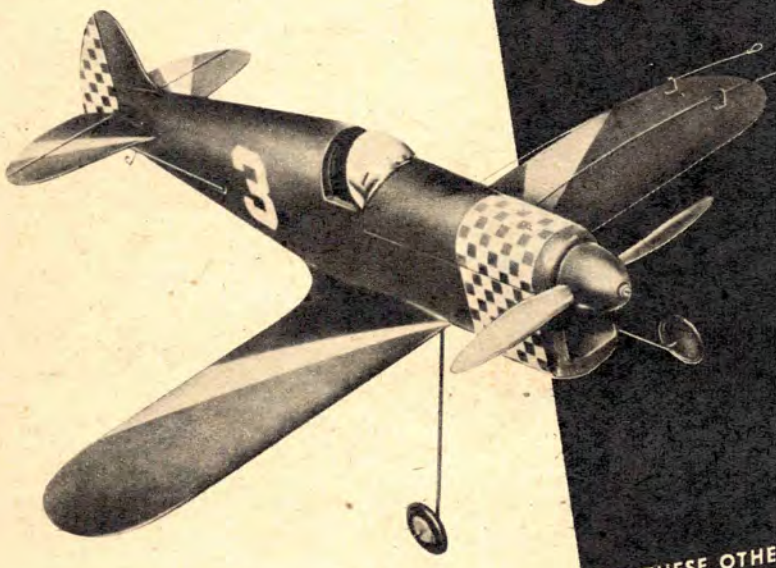

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propelled bike. But he stresses the fact that the company isn't producing any such item now; nor will it in the near future.

Already they are confident of building a jet car and preliminary designs have been under study for sometime.

Further, nearing commercial sale, is a jet heater which in tests has proven it can withstand temperatures down to minus 65 degrees, still start, still throw back a lot of heat.

"Beyond these things we have a lot of other items which I can't talk about now," Tenney says, "But one thing is sure—we ain't seen nothin' yet from the jet!"

CONTEST CALENDAR

List meets here! Advise Air Trails 90 days in advance to do the most good for your meet. If any area restrictions on entries, be sure to state. Address of contact man in same city as site of meet unless otherwise specified. Where info on events is furnished these are abbreviated as follows: indoor rubber powered—IR; outdoor rubber powered (unlimited)—ORU; outdoor hand launched gliders—OHLG; indoor gliders—IG; towline gliders—TL; free flight gas—FF; control line speed—SP; control line scale CLSC; control line stunt—ST; team racing—TR; combat—COM; radio control—RC; rise-off-water free flight—ROW; carrier models—CAR; free flight scale—FFSC; non-flying exhibition scale—NFSC; jet speed—J; controline endurance—CLEND; Wakefield—WAK.

Dec. 14—Bakersfield, Cal., FF record trials. Francis Stewart, 900—21st St.

Dec. 27-30—Orlando, Fla., 3rd Tangerine Internationals. Box 123, Orlando. ORU, WAK, TL, OHLG, FF, RC, SP, Half-A SP, J, ST, CLSC, TR.

Jan. 4—Cleveland, Ohio, Indoor meet. Gliders, pre-fab rubber power, duration, microfilm-covered, paper-covered events, six age groups. Charles Tracy, Aviation Editor, The Cleveland Press.

Jan. 11—Haddonfield, N. J. Highway Glo-Bugs' Polar Bear Meet. P. A. Karl, 20 Tanner St., Haddonfield. SP, ST, CLSC, TR, COM.

May 30-31—Boston, Mass. Seventh Annual Plymouth meet.

June 21—Johnsville, Pa. Phila. Plymouth Dealers' meet.

Sept. 7—Far Hills, N. J. Bedminster-Far Hills Meet.

Sept. 20—Harrisburg, Pa. Penna. State Exchange Clubs' meet.

Radio Control **NOTES from Tornado**

VALUABLE TIPS

For the beginner making his first attempt at Radio Control flying and those not too familiar with engine and prop combinations.

Using any 48 to 54 inch span—wing loading up to 16 oz. per sq. ft.

ENGINES: OK CUB .099, on this engine it is necessary to reduce the venturi opening by 50 per cent. This will allow better fuel adjustment for hand launching and violent maneuvers. Set needle on rich side of peak so that in climb engine is fully at peak RPM. ARDEN 099 works well as is.

Right thrust your engine 2° to 3°—this has been found ideal.

PROPS

FIRST TEST FLIGHT and LOW ALTITUDE FLYING—Use TORNADO R.C. 10 in. dia., 2 in. pitch. This gives a flying speed of 14 mph, 100 ft. altitude gain per min.
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HIGH ALTITUDE and VIOLENT MANEUVERS—Use TORNADO PLASTICOTE 9 in. dia, 4 in. pitch . . . for speed of 20 mph, altitude gain 350 ft. per min.
All speeds and altitude gains are approximate, depending upon engine condition, fuel, wing loading. The use of 1 oz. Castor Oil per pint of packaged fuels is advised to offset extra engine load of large diameter props. Use HOT Glo Plugs.
R. C. PROPS 10 in. dia, 2-3-4 in. pitch, 0.35c ea.
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32' CRUISER

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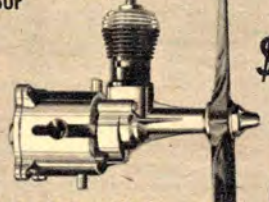

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Products

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Stole a MiG

(*Continued from page* 21)

found that I wasn't going to be able to clear a ridge of about 300 feet on take-off," Captain Cooper says later, "so I kicked it around and made a downwind take-off and just made it over a clump of trees—just barely."

The Captain heads back toward the coast with the fighter cover keeping pace above. He has struggled up to 5,500 feet when flak opens up from the ground batteries below, alerted all along the way by the activity back in the hills. The accuracy of the ground batteries is not only amazing but terrifying, for the very first salvo neatly brackets the struggling craft and rocks it with the blast of the explosions.

Captain Cooper drops her nose and steps up the speed to 120 knots, or nearly 130 mph, but still the flak comes close and the 'copter goes into high-speed stalls. Again and again the pilot pulls her back from dangerous situations, and finally breaks his radio silence to advise Lieutenant Danny Miller standing by off the coast in a smaller Sikorsky H-5 to be ready to come in and get them if they are forced to land.

When the heavily overloaded craft again settles down to a landing on the little island off the coast, a mighty jubilant and relieved gang of men tumble out of her. First of all they look over the faithful and temporarily "expendable" pinwheel that has made the project possible. They are stunned to see a jagged hunk of flak stabbed half way through one of the main rotor blades. It is hard to believe that, overloaded as she was, she had continued to plug right along even with one battered and unbalanced rotor.

Lieut. Miller with an H-5 has dropped down at the same island to help with the cargo, and so the load is split between the two ships, to lighten the load on the injured rotor. The two ships take off again and fly to a larger island where they wait for low tide to expose a "landing strip" along the beach for a transport landing. Then the MiG parts and men are transferred to the transport and taken to a Fifth Air Force base in South Korea. From there the battered but precious MiG parts are flown by faster transport plane to the United States for analysis.

Two days later, equipped with a new rotor blade, the historic H-19, no longer classified as "expendable," is back in service with its valiant crew, Captains Cooper and Winnegar. Later these two airmen are each given the Silver Star for their part in the historic "rescue," and as a souvenir they divide the jagged piece of flak that almost wrote finis to a group of daring men.

Half-Pep Racer

(*Continued from page* 31)

side, which is an advantage, it may be wise to use Victor Stanzel's Monoline control system. This makes possible positive control with light models, even if blown into the center of the circle. Slack lines do not affect the control of the model as this control system is not hampered by windy weather. The beginner, who has never flown control line before, should have little difficulty in getting the hang of this system; the conventional control system is shown on the plans.

It will be noted, there is a half-ounce of lead in the outside wing tip. This is used to keep the outside wing level. The engine can be offset to pull the model out, causing the lines to be kept taut at all times. It is essential that the elevator works freely.

All these things are necessary to assure ease in flight operation, for the model must practically fly itself. We must also watch the other models to see we do not tangle lines with them.

Balance the model approximately ¾" from the leading edge at the fuselage junction. A 5.5/4 prop is a good size to start our test flight with. Work both ways, checking to see which size gives the best results.

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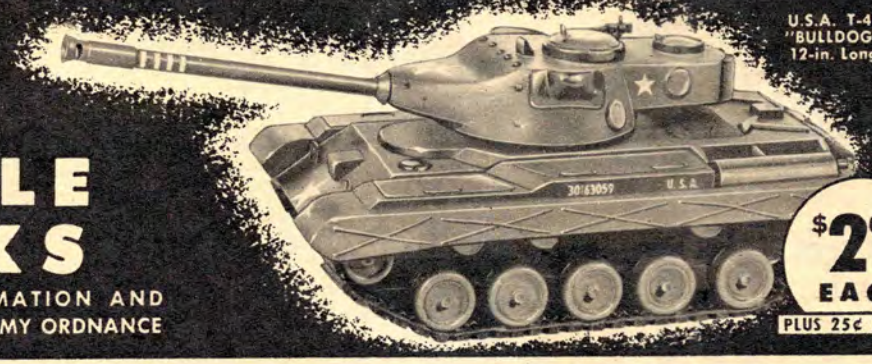

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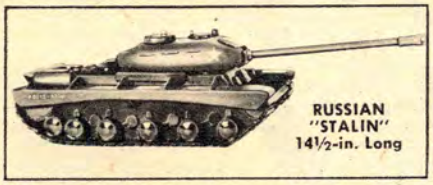

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Houn' Dog

(*Continued from page* 33)

At this point, (or, if you prefer, before you bolt the mounts on) dope or paint the various parts.

Then after everything is completely dry, slide the wing into place and secure it with eight pieces of gauze (1" x 1½") cemented in position top and bottom, fore and aft, both sides. Don't cement the wing directly to the fuselage. The pieces of gauze will hold it securely enough and will make it easy to remove.

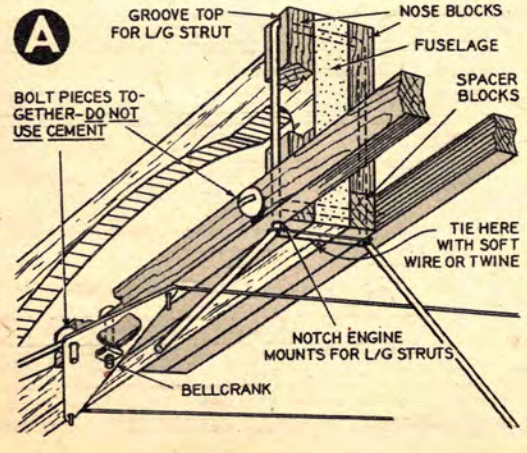
Hook up the lead-outs, slide them into guide slots, slip eyelets into place.

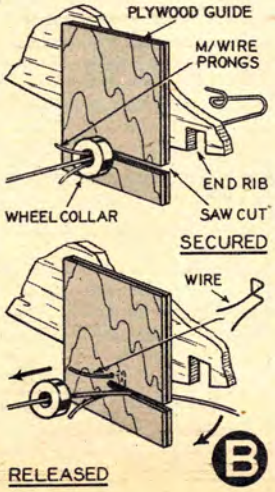
Place a drop of solder on the eyelets to keep them from working out, or, for lightning-fast on-the-field wing replacement, use wheel-collars to secure the eyelets.

Drop your engine and tank into position, and slide the engine to the point that gives proper balance. Model should balance about 1¾" aft of leading edge. Chop off the mounts to the proper length.

Most engines with the exception of a Fox will require a little more width for the crankcase than the mounts provide, but this can be taken care of very easily by means of a little whittling.

Sketches show optional construction.





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OK Cub .14

(*Continued from page 47*)

engine to start in two or three flips. With a light prime in the exhaust rather than choking, the engine would start with one flip. This was found to be worth while when starting the engine for high rpm on very small propellers. Performance was very good at all rpm, showing no tendency toward a sensitive needle valve adjustment or fluctuation in rpm.

The Cub .14 shows very good power at low and medium rpm, which should make it outstanding in the radio control and free flight applications. At the same time this engine is capable of 18,500 rpm and possibly more. This rare combination is attributed to the four-port design, combined with the large slot-type rotary valve.

Parts Illustrated

1. Base and needle valve body: die-cast aluminum, .72 oz. 2. Cylinder head: aluminum, .17 oz. 3. Cylinder: steel, .600" bore x 1 3/16" long, .70 oz. 4. Glow plug washer: copper, .032" thick, .01 oz. 5. Glow plug: steel, ¼-32 thread, .10 oz. 6. Back cover gasket (2): copper, .005" thick, .10 oz. 7. Piston: steel-hardened and ground, .600" dia. x 17/32" long. Piston rod: aluminum, 1" long. Wrist pin: steel, .125" dia., .29 oz. 8. Needle valve: steel and aluminum, .062" dia., .02 oz. 9. Crankshaft: steel-hardened and ground, .281" dia. shaft, .172" dia. crankpin, .39 oz. Drive Washer: aluminum, 11/16" dia., .05 oz. Front washer: aluminum 11/16" dia., .03 oz. Propeller screw: steel, 8-36 NF, .06 oz. 10. Cylinder head gasket (4): copper, .005" thick, .01 oz. 11. Back cover plate: aluminum, 1" dia., .09 oz.

Engine Data

Performance: Weight: 2.74 oz. Propellers —9/6 wide blade wood; 8,700 rpm. 8/6 wide blade wood; 11,400 rpm. 8/3½ wide blade wood; 12,200 rpm. 7/4 plastic coated wood; 16,000 rpm. 5/6 plastic coated wood; 17,300 rpm. 6/3 wide blade wood; 18,500 rpm. Fuel: OK Cub. Fuel level test: 11" at 11,400 rpm.

Design Data. Displacement: .149 cu. in. Class: A. Stroke: .530 in. Bore: .600 in. Stroke bore ratio: .88. Compression ratio head: 8.0. Compression ratio base: 1.47. Port area intake: .0315 sq. in. Bypass: .0344 sq. in. Exhaust: .103 sq. in. Ignition: OK Glow plug.

Construction Features. Bearings; crank shaft: hardened steel on aluminum. Crankpin: hardened steel on aluminum. Wrist pin: steel on aluminum.

Dope Can

(*Continued from page 40*)

flight area with all flights official unless interrupted above belt line of contestant. No flight scored if launched above height-limiting lines stretched across baggage car.

International B.C.G. Champion for this season was Tom Davey of Los Angeles. Tom accumulated the most points by making a high flight time of 8.5 seconds, a best-of-three time of 24.6 seconds, then flying the lowest duration model for a three-flight total of 12.2 seconds. This latter "switch" was the toughie; high man swaps planes with the low man, second highest with second lowest, and so on. And all this at 90 per!

Some good ideas here for a keen club contest; why not try them on for size? Suggest you dispense with the baggage car, however—a mite costly unless you're on an all-expense trip through the courtesy the local Plymouth dealer.

Can't Keep Those Wakefielders Down. John "Red" Hillegas (some day the boys will get smart and utilize Red's energies as president of the AMA) sends in some interesting dope on the Cleveland Balsa Butchers' year-end Wakefield meet. The CBB's were a top pre-war club; haven't been doing much organized work since until this annual Wakefield program was inaugurated. Interest in the event has long been high among the Balsa Butchers; at

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F-51 MUSTANG CL. BC.....$2.98

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an inter-city Wakefield fracas run off in Akron not so long ago the Cleveland club knocked off individual high time and the team event based on combined durations.

For this new annual competition for the large internationally recognized rubber-powered models, the Butchers established the Edward Deemer Memorial Trophy in honor of a former member. Deemer, an RCAF Flight Officer, lost his life in World War II as pilot of a Lancaster bomber when he was shot down over Holland, where he is buried.

First contest for the Deemer Memorial Trophy was held under windy conditions and in the face of a threatening storm which did break shortly after flying ended. Although sponsored by the Cleveland Club, the flying was held at the Akron airport with the cooperation of the Akron-Cleveland Women's Chapters of NAA. First five places went to CBB members:

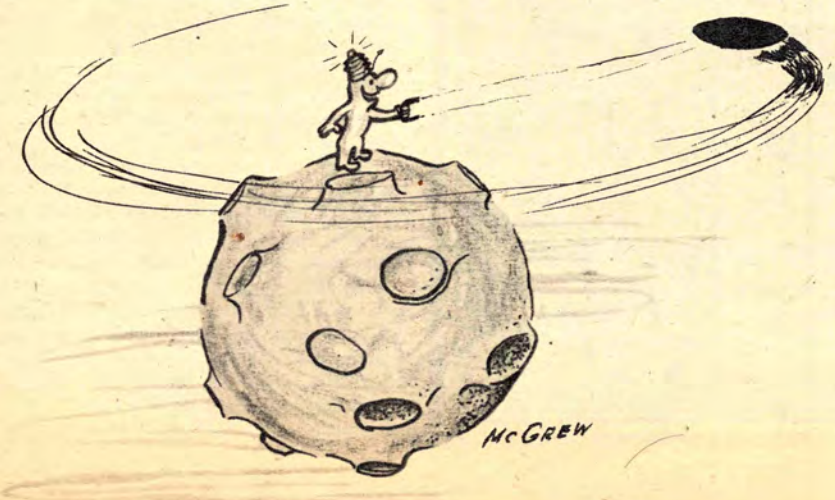
1) Matt Basta, 12:52.4 total; 2) Dick Korda, 12:47.7; Jerry Kolb, 11:41.6; Joe Elgin, 11:32.3; and George Jenson, 11:21.

Evidence of how interest in the Wakefield event grows comes from many localities. Lynn Skinner, 1004 N. Main St., Danville, Va., says that the building of big rubber models is on the increase throughout the South. "As of last year," writes Lynn, "I was the only fellow within 200 miles that enjoyed this type of model. Most of the fellows were control line flyers. Since last May we have had six fellows in this small town convert from C/L to Wakefield. We're planning a Wakefield club . . ."

Incidentally, the editors tell us that the next "AT" Model Annual (which is now "in the works") is going to have the most extensive coverage ever given to the U. S. and International Wakefield events.

Speaking of Plugs. Charles Tracy, aviation editor of the big Cleveland *Press* newspaper, gave "Air Progress" a tremendous plug in his columns. "Air Progress"—we

(*Continued on page 66*)



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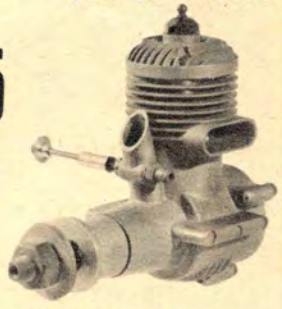

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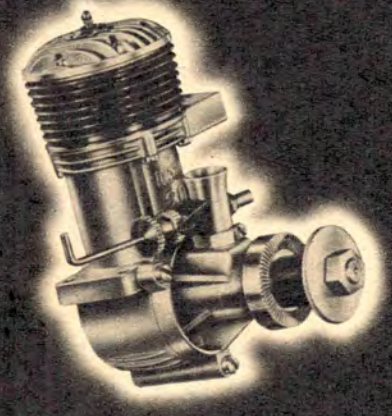

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John Werts, Jr., with his Arden .19 powered Zeek. The combination (John-Arden-Zeek) has won numerous Western contests and has held record.

Meet Famine Ends: Contests All O'er

■ The long contest drought is now over, much to the relief of the model builders especially in the Southern California area. For over two months we had none; now in the coming months we find contests every week end.

June Dyer, Publicity Manager of the NCFFC who writes that their 11th contest at Mather field was very much of a success with over 150 entries, says the line looked like the Nats at Long Beach; we hope it moved as fast. Dr. Alfred Dundas of San Francisco put up a huge perpetual trophy for the High Point Club and every club seemed to really get together and help each other in trying to win that mug. The Twin Cities Club, though, showed the other fellows real team work and won the trophy with ninety points to spare, quite a sizable total when one considers that the second-place Oakland Cloud Dusters had 176 points.

Chuck Primbs with an Arden .09 original free flight design. Tail is unusual; stab has very high aspect ratio and features down-swept tips.

Each contest brings out more old-timers. Don Minges came out to the NCFFC meet and walked off with high time of the day. Don says the last trophy he won was in 1946. June says it seemed like old times to see Charlie Wherle testing a new ship; Bud Romak hasn't changed—still out hunting ships after everyone else had left.

In the winner's circle after the dust had settled and all the dry ice had evaporated were Don Minges in Class

A, Norman Peterson in A/2, John Drobshoff in B and Al Grenoble in Class C. Joe "Dry Ice" Bilgri continued with his ever winning ways and won rubber, while Jeffry Oh won Junior Rubber.

The Juniors, not to be outdone, totaled times comparable with the experts to end up with less than a minute between the first three places. Gary McClellan

Wally Short and his Mac .29 powered "AWOL." A consistent winner, Wally walked off with Half-A honors at the Los Alamitos Nats in his class.

showed his heels to the rest of these youngsters.

Harvey Milts took time off from flying to be C.D. helped along by June, Nina Smith and Ellen Easter.

It is sure encouraging to find that there are some groups that really appreciate the work done for them and make it certain that fellows like Robert Vetter are not forgotten. The WAM thinks so much of Bob that the fund for the Robert Vetter Memorial Trophy is larger than the general fund balance. This trophy is to be awarded annually to the Club member who during the preceding calendar year accumulated the most places in the regular speed contests.

It is quite obvious when one looks at the third-quarter club point standings that the Aero Modelers of Alameda miss three guys, namely Jack Friedland, Mark Brown and Gene Stiles. We can't remember when we last saw that club behind in speed points. Losing these fellows, though, has made the speed events a little more even with only 15 points separating the first-place Hell's Angels of Napa and the Pittsburgh Cloudbusters. In Proto speed, however, the Aero Modelers more than hold their own. The Newark Model Busters continue to lead (*Continued on page 75*)

Two mighty good-looking fellows. Jerry Gaston and his latest team racer-beauty event winner. Power is a Torpedo .29; all up weight, 26 oz.

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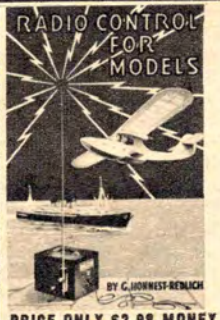

RADIO CONTROL FOR MODELS

SOME OF THE CONTENTS—"Radio Control for Models" written by G. H. Redlich, expert radio development engineer, is written in a manner that all can understand. The Author has successfully piloted a model across the English Channel via radio control, has displayed his aircraft etc. to British Air Force & military experts all over Europe. Good Brothers of U. S., Pepin of France & other experts are all represented in this book. Totals 128 pages, 14 chapters, high quality paper and excellent binding. Hundreds of new, different ideas are shown, measurement of amps, insulators, magnets, shielding, etc., all the important things you need to know to build your own set or to keep a purchased set in top operation condition. Escapements with 2 to as many as 12 operations shown, over 175 photos & circuits are given for sets, use of electric motors for control, solenoids, delayed action relays, mechanical movements, beep box used by Good Brothers, boat layout with forward, reverse, stop and half speed controls. Scaled down drawings are given for "Rudder Bug," ½ A "Queen Bee" and "Jige 213" radio controlled powered glider by Pepin of France. Complete trouble shooting information for senders, receivers etc. Here is a book you will use in your workshop and on the field with your models. Quality from cover to cover. Yours for a better knowledge of the many problems of Radio Work. ....

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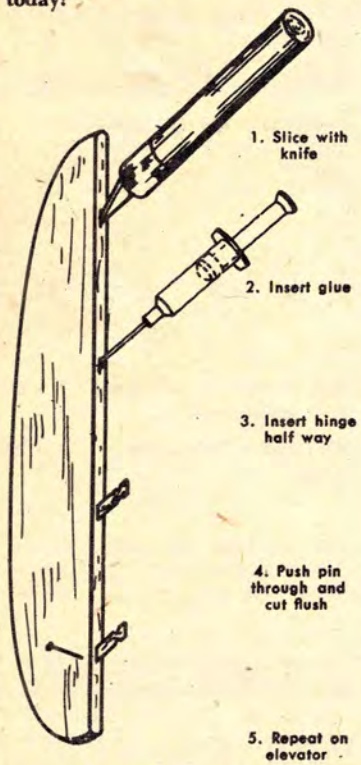

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"AT" Data Dept:

the pitch on true-pitch props

■ Gas modelers are lucky as far as propellers are concerned; for a mere pittance they can buy beautifully shaped and finished propellers of nearly any size imaginable. But serious rubber-power enthusiasts must design and carve their own propeller for each separate model while striving to get the most out of the limited power available. Inevitably, the correct layout procedure becomes a problem, and although this is really not a terrible task, much misleading information has been disseminated.

For purposes of simplicity, a geometrically *true pitch propeller* will be defined as one in which the chordline angle of each section is such that it would advance that section the same distance forward as each other section along the radius for each rotation of the propeller. That the tip travels much farther than the inboard sections during one revolution is obvious, and that the tip angle must be less than the hub angle may be appreciated by looking at the first diagram. To get the same height (pitch) from points nearer to the tip requires smaller angles as the tip is approached. If we know how to get *true pitch,* only then can we argue as to whether this is the most efficient twist or not.

We are after the most thrust from our available torque—right? Therefore each section should contribute as much forward component of force and as little sideways (in plane of rotation) force as possible. To do this all sections should operate at their angle of maximum Lift/Drag. True-pitch, or helical twist, will accomplish it if the airfoils are the same all along the blade and if there is no big fuselage behind the prop. The effect of the fuselage is to speed up the air near the hub. This effect requires a slightly higher geometric (carved) pitch in order to get the most out of the hub sections. In any case it is unwise to use too low a pitch near the inner half of the blade as this creates drag instead of thrust.

Near the tip we usually use a high-lift airfoil with undercamber which has its best L/D ratio at a higher angle of attack than a flat-bottomed section. It might be suggested that the carved angle near the tip should be slightly larger than true pitch to take advantage of this, and such is just the case. The Low Speed Aerodynamics Research Association (LSARA), which does most of the valid model reseach in the world, has shown in Technical Note No. 3 that a slight wash-in (increased incidence) near the tip may raise the prop efficiency slightly, while a slight wash-out (decreased angle) may reduce the efficiency seriously. *Any deviations from true pitch should be near the hub or tip and should be towards higher pitch!*

Reference to Figure 2 will show the simple relationship of block dimensions to radius and pitch. The general formula for helical twist is:

$$\frac{\text{Width}}{\text{Height}} = \frac{2\pi \times \text{Radius}}{\text{Pitch}} \text{ (all in inches)}$$

and its two convenient forms are:

$$\text{Width} = \frac{6.28 \times \text{Height} \times \text{Radius}}{\text{Pitch}}$$

or

$$\text{Height} = \frac{\text{Pitch} \times \text{Width}}{6.28 \times \text{Radius}}$$

where Height, Width, Radius, and Pitch are at any given station.

It appears that for a constant *depth* block the width should be proportional to the radius of that station, and any form of diagonal straight lines gives true pitch. (See Figure 3). Conversely, *wherever diagonals are used* in the top view, the block should have *constant depth.* Most published "true pitch" prop block diagrams show a *cut-away* hub before carving, but this *is not correct* and will *reduce* pitch near the hub, just the opposite to what is best. For "diagonal" parts leave the full block depth while carving the undersurface corner to corner, then cut cut away as much as desired once the true pitch has been established.

Wherever a *constant width* is present the height must be proportional to $\frac{1}{\text{Radius}}$ which *is not a straight line* in side view! (See Figure 4). This may be a shock to those who

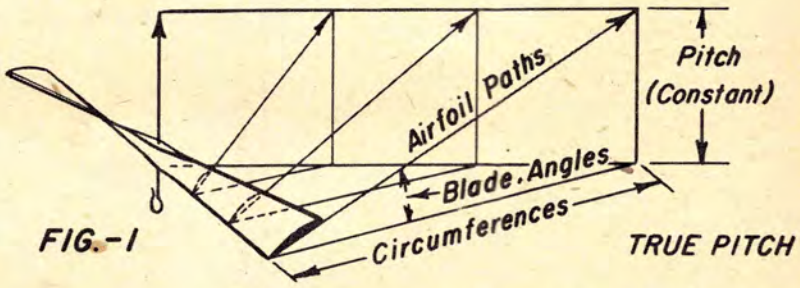
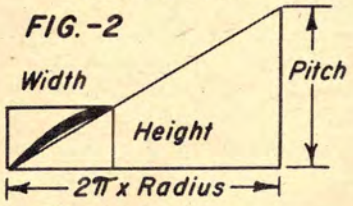


FIG.-1

RELATIONSHIP

FIG.-2



At any station

$$\frac{\text{Width}}{\text{Height}} = \frac{2\pi \times \text{Radius}}{\text{Pitch}}$$

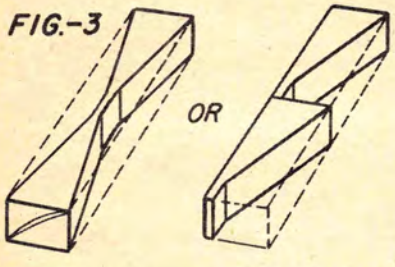
have calculated the block dimensions of a conventional type at the middle and tip, which will give true pitch at those points. But the fact remains that in between—near three-quarters tip radius—the pitch of a straight-lined blank (side view) will be greater than true pitch. However, the LSARA results showed no harmful effect from tip wash-in so the error may not be detrimental to efficiency. If you are in a hurry, leave the tip height reduction as a straight line, but *for true pitch where the block width is constant, compute one or two intermediate heights from the third formula.*

To illustrate the points brought out, let's actually carry through the layout of a Wakefield prop blank. For a start we'll choose a diameter; although this does not affect the formulas it does help decide on a pitch and block size. For those big Wakefields about *eighteen inches is a good diameter* for a two-bladed prop, and a pitch-diameter ratio of 1:7 seems to give a long, powerful climb. This gives a *pitch of about 30 inches.*

Blade width is determined primarily by the maximum block dimensions and since we don't know these yet we're stuck. But experience can help here when aided by a little rough guessing. Blade angles near the maximum blade width seem to come out in the neighborhood of 45 deg. so we can "guesstimate" a preliminary block and adjust the height or width

DIAGONALS GIVE TRUE PITCH IF DEPTH IS CONSTANT

FIG.-3



according to our calculations. A 2-inch square block is easy to buy and when trimmed and sanded will probably give a blade width of around 2.5 inches—not bad for an 18-inch prop. So we fix the pitch—30 inches, and the block width—2 inches, and adjust other dimensions to suit.

First decide where you want the maximum width of blade—often 50% of the radius is chosen for conven-

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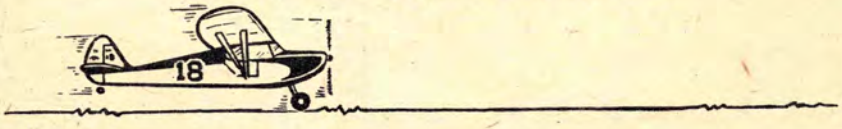

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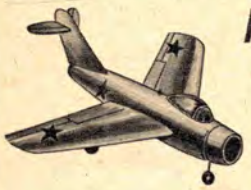
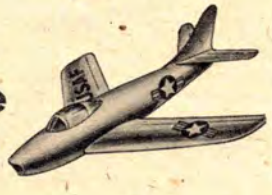


MIG-15
KIT J-2



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DATA DEPT. (cont.) The Pitch on True-pitch Props

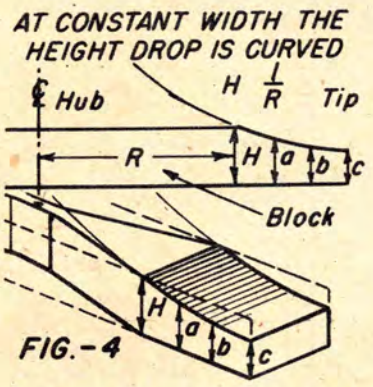

FIG.-4

ience, but we prefer to have it at about ⅔ tip radius. It really does not matter as long as *the tip height is the same proportion of the block height, as the radius of maximum block dimensions is of the tip radius.* Thus for our prop, if maximum blade width is at ⅔ tip radius, then tip depth should be ⅔ of maximum block depth, whatever we find that to be. Inboard of the ⅔ point we shall use constant depth with diagonal top outlines, and outboard we well reduce depth at constant width in accordance with the true pitch formula.

The block depth at ⅔ tip radius, or 6-inch radius is, then:

$$H = \frac{P}{6.28} \times \frac{W}{R}$$

$$H = \frac{30}{6.28} \times \frac{2}{6}$$

H = 1.6 inches, or about 1⅝".

This will give us a basic block of 18"x2"x1⅝".

From the hub out there will be true pitch if the diagonals are drawn from opposite ⅔ tip radii on the top and bottom of the 1⅝ in. deep block. There remain three inches to the tip at a constant width of 2 inches. Taking each remaining inch as a station:

Radius	Width	Depth exact	Depth nearly
6"	2"	1.60"	1⅝"
7"	2"	1.37"	1⅜"
8"	2"	1.20"	1¼"
9"	2"	1.06"	1 1/16"

There are just four simple divisions which are particularly easy since we can figure the part—$\frac{30 \times 2}{6.28} = 9.6$ is constant and divide this by each radius.

The fore and aft distribution of the depth at each point does not affect the pitch noticeably and may be left to the whim of the designer. Easier carving and attractive shape result from an equal cut-down from both faces. *Just be sure the correct height and width occur at each corresponding radius.* Cut the block out as in Figure 5 and carve in the usual fashion from corner to corner underneath first, put in underchamber, cut away the hub and tip shape, carve the upper surface, and finally sand the whole to a thin smooth airfoil.

Use of these suggestions will result in a true pitch propeller without wasting most of the block as would be the case if a total diagonal design were tried. These suggestions are applicable to *any* given profile or plan view.

—BY HENRY R. JEX

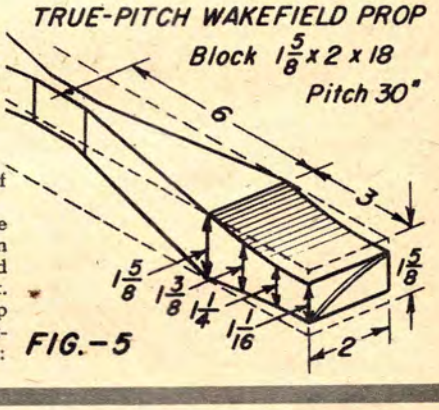

FIG.-5

Dope Can

(*Continued from page* 61)

hope you know!—was an Air Trails' "extra": pictorial history of aviation with 1,000 air illustrations. (Still some available from the "AT" offices for only 50c).

Well, now, we want to "plug" one of Charlie's big deals. It's the 1953 Indoor Air Meet set for Sunday, January 4, in the huge Municipal Auditorium. Sponsors are the *Press*, Cleveland Coca-Cola Bottling Company and the city's Recreation Division. Charlie is very positive about indoor meets being the best way to get the novice off to a good start. And who's to argue? He comments:

"Since some so-called experts have already 'buried' indoor competitions, I wish you could give us a little special consideration in the way of calling attention to this meet. As we do it here, it's really one of the best ways to get new, young blood into the hobby and we'll all agree that there isn't enough of that done anymore these days. Of course, we don't overlook the microfilm boys, either, because they provide the inspiration for the young kids. Actually we wouldn't have to rent the Public Hall just to fly Quickies and Jig-Time ships except that mixing the super-juniors in with the experts makes for real interest."

There are six age classes in the meet with various events depending on age level of the contestant. The auditorium is 85 feet high and has a floor space of 120 by 240 feet. Full details and application blanks from Mr. Tracy at *The Press* or call CHerry 1-1111.

You know, when you stop to think about it, Cleveland is probably the most "enlightened" model city in America. Indoor flying! Wakefield flying! All the usual C/L and F/F activity! And don't overlook the annual National Scale Model Exhibition held there, too.

National News from Flypaper. Congratulations are in order for the Bucks County, Pa., Federation of Model Airplane Clubs' sprightly little newssheet, "Flypaper," which recently celebrated its first birthday. The publishing staff puts out one of the finest air-model papers in the country.

We've been pretty certain for quite some time that the 1953 Nationals would be held in the East, probably in the neighborhood of Philadelphia or Norfolk. But could we

get any official word out of Washington until just at press time? Nossir! The first word came from the FMAC "Flypaper":

1953 NATIONALS AT WILLOW GROVE VERY PROBABLE

On September 25th a group of top Navy brass, Russ Nichols, Matty Sullivan and Exchange Club officials met to discuss the possibility of holding the 1953 Nationals (at Willow Grove). Matty Sullivan will be the contest director. The regular Johnsville-Plymouth meet may be moved into June. Indoor events will be held at Lakehurst, N. J. The Bucks County Federation will be asked to run the Team Race. Mind you, this is NOT 100% official, but it is pretty straight dope.

Buncha Pirates. Yep, Tampa (Fla.) seems overrun with them. Officially, they're banded together at the Pirates Model Club. Boys 'n' gals, men 'n' women—from six on up. All control line flyers, the majority beginners and most of them partial to the B and C size engines. Meetings are held every Thursday night at the Sulphur Springs Recreation Center; if you're about, drop in. Club brass consists of Eugene Dibble, pres.; Eddie Richburg, veep; and Ralph Turner, sec-treas.

Training classes are held every Sunday afternoon; new flyers are checked out on the "Rockie" (Rookie, maybe) trainer. When the American Legion ran off a contest not long ago club members Ralph Haney, Ed Newman and Ray Wilcox walked off with top honors. Rosa Lee Newman, who's telling us all this, won first in scale beauty with a very nice looking Pitts Special. It was her second model. (Sorry, boys, it's "Mrs.")

Rosa Lee wants to tackle a Convair 240 or Chicago & Southern Connie. Ma'm, that's a mighty big order. Sorry to say, we know of no such kits.

Ball of Fire. We've been hearing of a real model and full-scale aviation enthusiast out Menlo Park, Calif., way by name of Allan Macdonald, Jr. Al, who lives at 685 San Mateo Drive, worked out a splendid progressive training program for his 20-member Air Adventurers group. The group would like to compete with nearby clubs in model tournaments. Any takers?

Some Questions—Not All Answered. We get them by the bushel basket, you know. Referring to questions. They come in from all over the world. We try our durndest to answer them all, but occasionally words fail us. Take this one from Brazil: "I designed a jet model for the Dyna-Jet engine. It's almost similar to the Skyrocket. I mean the outline view; but this one has a much larger wing area. The model should weigh 5 lbs. in total. Has a span of 60" and a length of 63". Seems to be okay until now; but it is not U-Control. It's a radio control model. Macnabb Citizenship unit is used. But this combination of jet-radio control was never used as far as I know.

"I have already started building it, but my question is will the radio control work satisfactorily with the Dyna-Jet? I have a Grumman Panther with this engine and I find it too fast for U-control so I am going to try the radio way. The Macnabb range is about one km.; with the highspeed of the Dyna-Jet it will be difficult to keep the plane in that small a circle. Could you tell me if this combination is possible and if it is, how can I increase the range of the R/C?" All this from Alfredo Lavrinenco, Languiru, Mun. de Estrela, Rio Grande do Sul, Brazil.

Alfredo, we think you've bitten off a bit more than most modelers could digest. We have yet to see our first Dyna-Jet powered free flight model. If we did see one we hope it would be a very stable job with ample wing area, certainly not a Panther model. As for radio controlling the affair, we'd first like to see you master the intricacies of jet free flight before adding radio control. Better still, keep your Panther with its Dyna-Jet on the end of longer lines. Try an accepted design for radio control. Something with a diesel, glow plug or conventional ignition type engine. Sounds to us, Al, as if you'd been subjected

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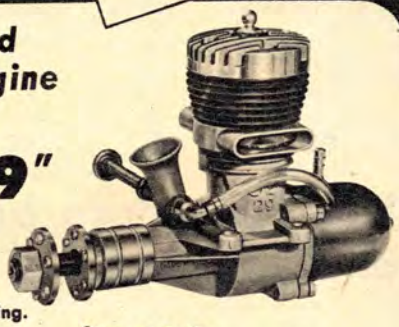

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By the way, Al, D. G. Jackson, 11 Augustus St., Brooks Bar, Manchester 16, Lancashire, England, has a friend who lives in Recife, Brazil. This friend wants to know the location of the nearest hobby shop to Recife. Write and tell Jackson so he can pass the information on to your fellow countryman, will you, Alfredo?

Mr. Jackson is seeking a U. S. correspondent whose main interest, like his, lies with flying scale models, both free flight and control line. He has just completed a 1-to-1 copy of the S.E.5 powered by an Amco diesel and featuring pendulum controlled elevator. Job weighs 12 ounces.

Caleb R. Glass, F. L. Smith Drug Co., Kannapolis, N. C., is after a Cleveland plan of the Stinson Reliant. Desires same for R/C project. Anybody got?

Raymond Dulski, Box 386, Perham, Minn., wants to swap model making plans. Contact him for details.

G. N. Hone, 57 Park Hill Road, OYorch (that's what the man wrote), Kent, England, is looking for a writing pal in the States. Between 14 and 15 with a liking for Class A and Half-A free flight and control line. Hone's latest is a team racer of 180 sq. inches that scoots around at 80 per. He signs his letter Geoff.

Robert Olofson, 235 Maple St., Seymour, Conn., should be glad to meet Geoff. Geoff, shake hands with Bob. Bob, Geoff. Olofson said, "I would like to correspond with someone in England about 14 or 15 years of age and interested in free flight, stunt or team racing. Would like to exchange ideas and the like."

Don Johnson, Box 325, Tishomingo, Okla., has graduated from rubber to gas and is getting interested in amphibious gassies. Looking for a pen pal of similar outlook.

Joe Cario, 6716 Cornelius St., Philadelphia 38, Pa. (West Oak Lane) is after an Air Trails drawing, Plan ATA #51. We know there are a lot of them around since it included Cal Smith's F-82, Musciano's Bellanca and the Easy-Bo. So if you're through with yours drop Joe a line. It's a good idea to order the full-size working drawings as soon as they become available if you figure you might build any model on any particular plan.

In case you aren't familiar with these plans, just let's say that each is 35 by 45 inches in size and has full-size working drawings on each side. Each plan gives all the drawings for building 2, 3, 4 or 5 models, depending on the size of the ships. You'll find the available plans listed in each issue. Air Trails does not maintain a perpetual inventory, which would require just too much space, so the supply runs out rapidly. If you think you'll use a plan, order right after the model appears in print; otherwise you may find the supply of plans exhausted when you're ready to start building.

Testing Laboratory. Philip Lang of Brooklyn realizes that it's pretty late to be contesting a statement made in an issue of Air Trails last winter, but he dug up such interesting data we feel that his facts will be of special significance.

In this column we quoted someone as opining that the "Jaded Maid" free flight designed and built by Norman Marcus was the outstanding free flight of the 1951-1952 former British contest season. Phil isn't arguing that the model didn't win the most first places, nor that it didn't have high flight times (which it did, definitely), but somewhere along the line someone said it was the "greatest"—that's what upset him. As a test he buit a "Maid" just as specified, changing only the engine by substituting an O&R .19 for the 2.5 diesel. At the same time he also built a comparable American free flight.

Flying both models together under identical conditions, Mr. Lang found that the U. S. kit design was far superior to the British. The American model was stronger, trimmed out easier and when it did meet an obstruction, it didn't fold up like the English model with its extremely light wing loading achieved mostly from under-size balsa strips. The U. S. kit model was much more consistent in its flight times, too. Sorry we can't report what kit, Phil didn't say. But his lengthy report does convince

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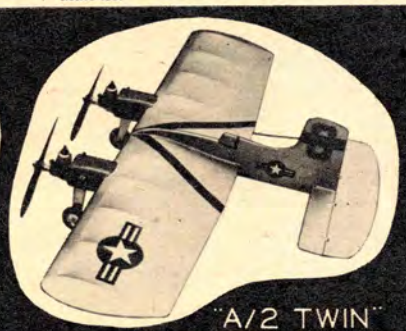

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us that he gave both models the same treatment and showed no favoritism. If anything, we think he started out pro-British.

Key West Club. We're not trying to get into Howard McEntee's act, but along with a club report from Key West we picked up call letters of two Ham operators who are also strong for R/Cing with model planes and are most willing to chew the fat with similar minded ops. So if you hold a ticket and you're DXing, try W4PWU and W4EFH. Charlie Faraldo, Box 423, K.W., figures we'd all like to know about the southernmost model group in the U. S. Civilians and Navy personnel got together and set up the Island City Modelaires. Since the island is only 3 by 7 miles and thickly populated, flying is restricted to U-control and R/C. Many of the Navy boys are prominent modeleers from all over the U. S. As such we'd have thought that ROW F/F would be a favorite, too. Charlie reports that the ICM's have nine radio-control models and that a big percentage of the standard amateur radio fans are evincing interest! He built the "AT" 27¼xmtr and rcvr; worked out so well he has another rig underway for a friend.

Seventeen Years Old. The Model Aircraft League of Saskatchewan was formed in 1934 and except for a short time during the war has been very active ever since. During the last four years the M.A.L.S. has organized beginners clubs at different schools during the winter months and supplied instructors to the Navy and Air Cadets (age 14 to 20). Charles Leech, president of the League, tells us that headquarters is at the Youth Center, 1933 Hamilton St., Regina, Sask. The League runs three main Provincial contests each year. One is in Moose Jaw around May 24, the Provincial Plymouth Finals is at one of the five larger cities usually the first week in July and the big "Labor Day" competition which comes naturally enough on the first weekend in September. The M.A.L.S. uses AMA and Plymouth rules. A cordial invitation to membership is extended to all.

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1/16x1/8	6	5c
1/16x3/16	4	5c
1/16x1/4		1c
1/16x3/8	3	5c
1/16x1/2		2c
3/32x3/32	6	5c
3/32x3/16		1c
3/32x1/4	3	5c
3/32x3/8		2c
3/32x1/2		2c
1/8 x1/8	4	5c
1/8 x3/16	3	5c
1/8 x1/4	2	5c
1/8 x3/8		3c
1/8 x1/2		4c
1/8 x3/4		5c
1/8 x1		6c
3/16x3/16		4c
3/16x1/4		4c
3/16x3/8		5c
3/16x1/2		6c
3/16x3/4		8c
3/16x1		9c
1/4 x1/4		4c
1/4 x3/8		5c
1/4 x1/2		7c
1/4 x3/4		10c
1/4 x1		12c
5/16x5/16		5c
5/16x3/8		6c
5/16x1/2		8c
5/16x5/8		9c
5/16x1		12c
3/8 x3/8		7c
3/8 x1/2		10c
3/8 x3/4		12c
1/2 x 1/2		10c
1/2 x3/4		15c
1/2 x1		14c
5/8 x5/8		15c
5/8 x1		18c

PLANKS
36" Lengths

1/2x2	20c
3/4x2	25c
1 x2	35c
1½x2	50c
2 x2	65c
½ x3	35c
¾ x3	40c
1 x3	50c
1½x3	70c
2 x3	90c
3 x3	1.35
1/2x4	40c
3/4x4	55c
1 x4	75c
1½x4	95c
2 x4	1.25
3 x4	1.80

SHEETS
36" Lengths

1/32x2	7c
1/16x2	7c
3/32x2	8c
1/8 x2	9c
3/16x2	11c
1/4 x2	13c
1/32x3	11c
1/16x3	11c
3/32x3	13c
1/8 x3	15c
3/16x3	17c
1/4 x3	19c
3/8 x3	27c
1/32x4	15c
1/16x4	15c
3/32x4	17c
1/8 x4	20c
3/16x4	23c
1/4 x4	25c
3/8 x4	36c

BLOCKS
6" Long

1x1	3c
1x2	6c
1x3	9c
1x4	13c
2x2	11c
2x3	16c
2x4	22c
3x3	23c
3x4	30c

12" Long

1x1	6c
1x2	12c
1x3	18c
1x4	26c
2x2	22c
2x3	32c
2x4	44c
3x3	46c
3x4	60c

18" Long

1x1	9c
1x2	18c
1x3	27c
1x4	39c
2x2	33c
2x3	48c
2x4	65c
3x3	70c
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Foreign News Notes

Towliners easily top all other types

■ For sheer duration, which is the best bet: towliner, free-flight gassie or a good rubber-powered job? Believing it to be a near toss-up, members of the Sutton, England, Model Club permit the types to compete with one another in determining Club Champion, who must defend his title monthly. Limitations are 328 ft. maximum towline length, twenty seconds engine run, no handicaps for rubber models. Past five monthly winning jobs have been towliners; top aggregate time being 9 min., 36 sec.

"Elf Axe" (Fig. 1) is a small British free-flight gas model designed expressly to overcome frequent failings of conventional pylon types: looping and spiral diving. John Lamble, designer, raises thrust

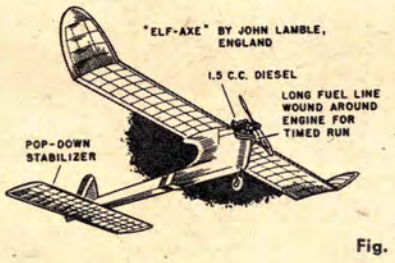

Fig. 1

line near wing location, employs long, flat centersection with upturned tips. No downthrust is used. Slight left tab offset gives "steady but deceptively fast climb" in broad, flat circles to left with left turns also in glide. Right side thrust is used to offset any tendency to bank excessively in left power turns. Ship spans 46 in., has 329 sq. in. wing area, weighs 13¾ oz., is powered by 1.5 c.c. diesel engine.

Not yet popular in this country, "slope soaring" with specially designed model gliders (Fig. 2) has a great following in

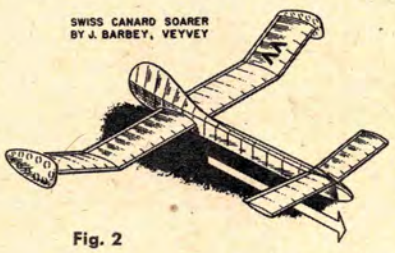

Fig. 2

continental Europe and England. In a recent issue of "Model Aircraft," C. Bates outlines design requirements of the type. More robust than usual towliners, they are built up of stout materials, most obvious departure from standard glider proportioning being increased fin area for weathercocking into the upward deflected breeze.

Trim, too, varies from usual practice with a minimum of longitudinal dihedral (difference between wing and stablizer incidences) to minimize induced drag. Long, straight centersections with upturned tips are held to be superior to usual polyhedral. When released from shoulder height, ships seem to virtually hover in straight flight. Sharp trimming know-how

AIR PROGRESS '52 ANNUAL - 50¢

Aviation experts everywhere have greeted it with such bouquets as "Swell!", "Makes a wonderful reference work," "Should be several copies in every junior and senior high school", "The Civil Air Patrol can use the book well in its Cadet training program", "Scale model builders can't afford to be without it."

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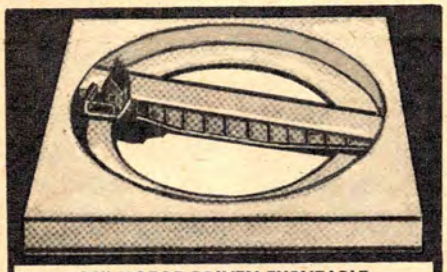

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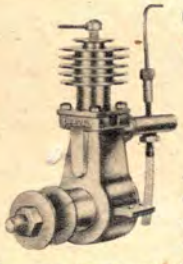

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½A ENGINE, 17½" SPAN - - - - 95c

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Foreign News Notes cont'd

is essential to master "crab-track" technique in which model tacks along a ridge, neither turning downwind nor upwind.

"Ducted fan" pseudo-jet models have been successfully flown by English designer Phil Smith. Small engine, mounted in hollow fuselage, is started by cord via removable hatch (Fig. 4). Thrust comes from multiple-blade "impeller," tips of

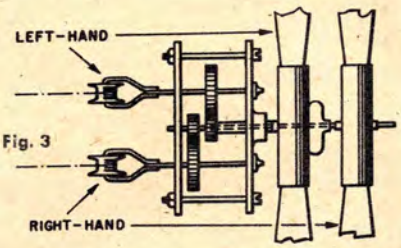


Fig. 3

GENERALIZED DIAGRAM OF CO-AXIAL PROPELLER MECHANISM SEEN IN RUSSIAN MODEL PUBLICATION

which fit close to circular throat of duct. Advantages are tremendous realism, good flight performance, improved stability through gyro effect of high-speed impeller. Power-on adjustments can be made by vane mounted in tail orifice. Tests revealed impeller threw half of displaced air outward; close fitting duct diverts all air rearward, so gains thrust. Smith reports lightness in structure is chief "must."

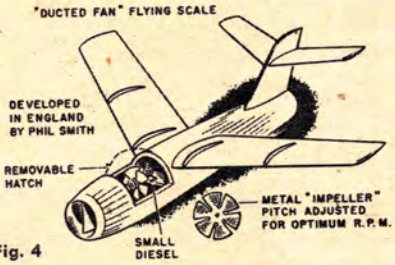

"DUCTED FAN" FLYING SCALE
DEVELOPED IN ENGLAND BY PHIL SMITH
REMOVABLE HATCH
METAL "IMPELLER" PITCH ADJUSTED FOR OPTIMUM R.P.M.
SMALL DIESEL

Fig. 4

Most scale jet types need intake ducts increased over true scale for "ducted fan" flying models since duct should not reduce in cross section area at either end.

Guido Battistella, Lido Venezia, Italy, sends photos and details of beautiful control line racers (Fig. 5) built by him and his friends. Evidently impressed by Newburger's Whirlaway design, ships feature soldered lower shells of dural, dural riveted wings, beautiful craftsmanship.

Though not new, the idea of rigging a

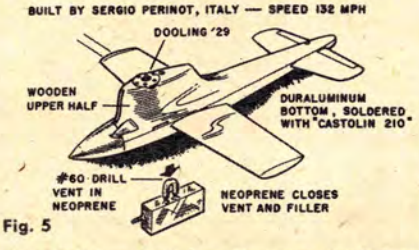
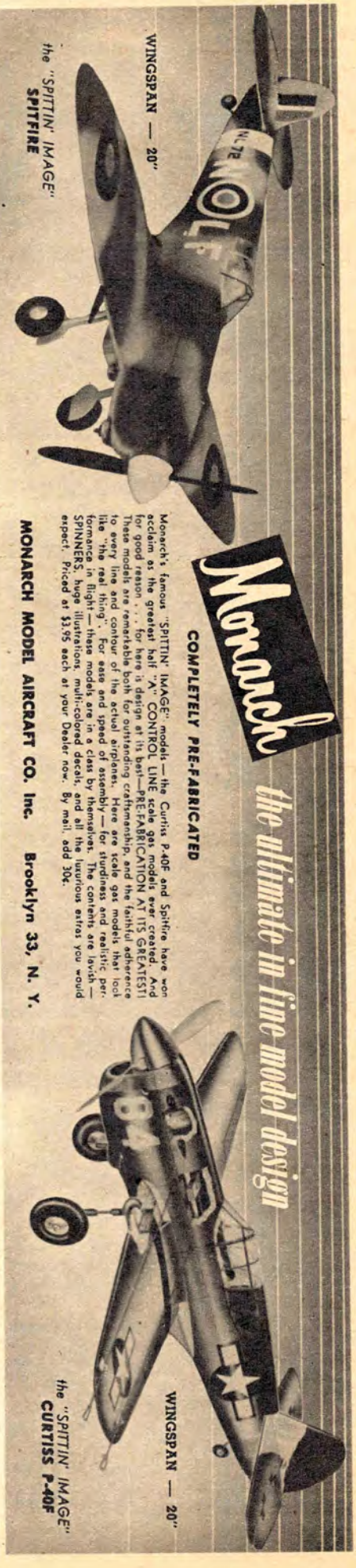

BUILT BY SERGIO PERINOT, ITALY — SPEED 132 MPH
DOOLING '29
WOODEN UPPER HALF
DURALUMINUM BOTTOM, SOLDERED WITH "CASTOLIN 210"
#60 DRILL VENT IN NEOPRENE
NEOPRENE CLOSES VENT AND FILLER

Fig. 5

free-flight model for stunting doubtless has very few followers at the moment. In England, B. J. Page and M. M. Gates have achieved notable success with a cavorting gassie whose antics are brought about by a pneumatic timer pulling an irregular cam against rubber-loaded followers which are connected to control surfaces. Model climbs to altitude with no control movements, then fireworks begin as cam actuates flippers, rudder. Then controls straighten for ordinary glide and landing. Cams are substituted to vary stunt sequence.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Minor Mach

(*Continued from page 41*)

wing panels together it is wise not to apply too much cement at once, since this will cause air bubbles to appear in the cement, making a weak joint. Several thin coats produce a stronger joint.

The fuselage is from hard balsa. If there isn't any available, bass will do if slimmed down a little. Be careful that the wing is cemented on straight and that both the tips are the same height from the table when the fuselage is perpendicular to the table top.

Cement the stabilizer on first and check to see that it lines up with the wing. Make sure that the rudder is perfectly true, otherwise this will show up when the model is traveling at high speed.

Install the timer in place with a piece of string attached to the elevator. Carve a balsa block to the shape shown and hollow it out to house the timer. When it is shaped to size, it is tack-cemented in place. When the model is finished it will need to be balanced with additional weight and this will be packed around the timer so as not to affect the moment arm.

Sand the entire model until it is smooth and then dope. When dry, sand again and repeat this until a glass-like finish is obtained. As the procedure is continued, the sandpaper should be of a finer nature each time and the dope should be thinned out.

Although this model climbs with one adjustment and glides with another, it will not offer any special problems. With the timer at the "in" position, stand on an embankment, glide the model at a good speed. Add weight to the nose until a smooth glide is obtained. This should be a little faster than on the ordinary glider as the weight is higher and a slow glide is only a mush—and that is not wanted, for a fast flat glide is desirable.

Set the timer for about three seconds, and using 25 strands of rubber four feet long, catapult the model straight up releasing the timer and the glider at the same time. Watch to see that the timer pulls the up elevator just when the model reaches the top of the climb. If the model climbs in an outside loop, the elevator has too much down and this should be reduced until the ship is climbing straight up. If the model climbs in a regular loop the opposite adjustment is the cure. After nice flights are obtained, power is added until the model is a mere speck in the sky.

1953 NATS TO BE HELD AT WILLOW GROVE, PA.

The United States Navy in cooperation with the Academy of Model Aeronautics announced that the U. S. Naval Air Station, Willow Grove, Pennsylvania, has been named as the site of the 1953 National Model Airplane Championship Contest.

The 22nd running of this annual event will be sponsored by the National Exchange Club. The contest will open July 27 with indoor flying events being conducted in one of the massive airship hangars at the Naval Air Station, Lakehurst, New Jersey. All other phases of the meet will take place at Willow Grove, winding up with a victory banquet August 2, 1953.

It is expected to draw more than 1,500 contestants and several hundred mechanics and helpers from the 48 states, Alaska, Canada, and Mexico.

Contestants and helpers will be guests of the Navy during the week-long contest. They will be fed Navy chow at a nominal charge and housed in Navy barracks on the station.

Officials of the National Exchange Club and the Academy are planning a schedule of challenging events which

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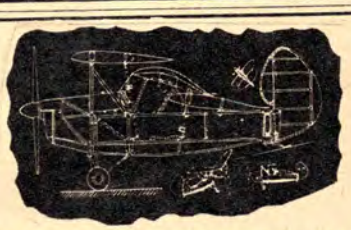

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R/C Roundup

(*Continued from page* 12)

in England. He has used 1S4, 3V4, 3S4 and 3A5 tubes in it with good results. Sez that he has used 45 V. satisfactorily, but up to 90 V. seems to give better range.

A few checks here have showed that the antenna length is quite touchy, if you want the best results. The length may be adjusted by clipping off short lengths, but a better method is to put in an antenna series condenser of 3-30 mmf. range for such adjustment.

Dean Flower, Richmond, Mich., asked if the circuit was intended for 27¼ or 50 mc.; it is for the former. We will give more data on this receiver, after more tests have been made.

Joseph Lippert, Jr., Bethpage, N. Y., says that he couldn't get good results from the Annual receiver till he connected the metal end of the coil form to one of the filament leads of tube. A good trick and might help reduce the detuning effects of bringing a screwdriver near the core screw.

Commercial News. Price on the kit for the Live Wire Senior, mentioned here last month, has been set at $14.95. Available from deBolt Model Eng. Co., Williamsville, N. Y., who write that they have tried out the new Cub .14 engine in their regular Live Wire plane with very satisfactory results. Makes a hot combo.

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Complete instructions and diagrams for building your own R/C transmitter and receiver; working drawings for McElwee's "Robot"; plus "Build Your Own Beep Box." Send 35¢, print your name and address plainly, to Air Trails, 304 East 45th St., New York 17, N. Y.

Vernon C. Macnabb Co., Indianapolis 20, Ind., has announced release of their 27¼ equipment. Consists of a single tube (3V4) receiver, and a two-tube transmitter. Latter is in same size case as their 465 mc. unit (which will still be available) but has a 48" whip antenna. It uses two 3V4's, and of course, is crystal controlled.

Control Research, Box 9, Hampton, Va., has new list of R/C parts they can supply. Most parts are now shipped by first class mail to speed delivery. Concern has shipped several hundred kits, plus many extra parts for the A.T. Annual receiver and transmitter. They will carry Sigma 4F relay (brand-new—not surplus) at around $9-10.

As radio ships get more complex, the value goes up, and a flyaway and loss of such a ship can be a financial tragedy. *Good* R/C ships don't fly away, of course, but then there is always that experimental "dog" you fly that may still be worth fifty or a hundred dollars, if you were to replace all the parts in it. You can prevent such a loss, though, by taking out insurance. Many flyers do not know that the AMA has such insurance, and that it also covers damage by fire, lightning (!), theft, damage by the general public (such as those dumb spectators who step on models), etc.

Crackups and wear and tear are not included, but tools and equipment are. You are allowed to collect $100 for R/C ships.

(*Continued on page* 75)

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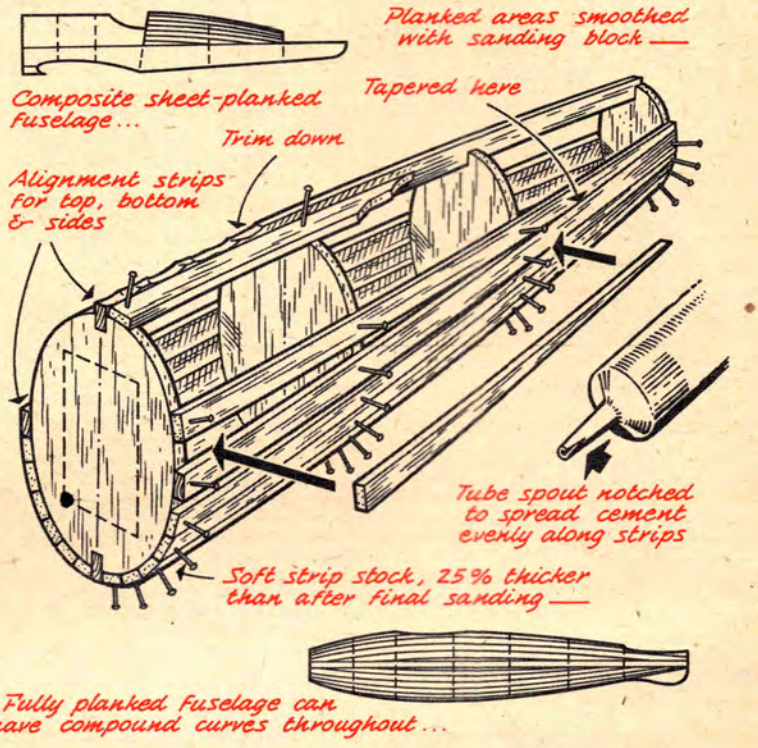
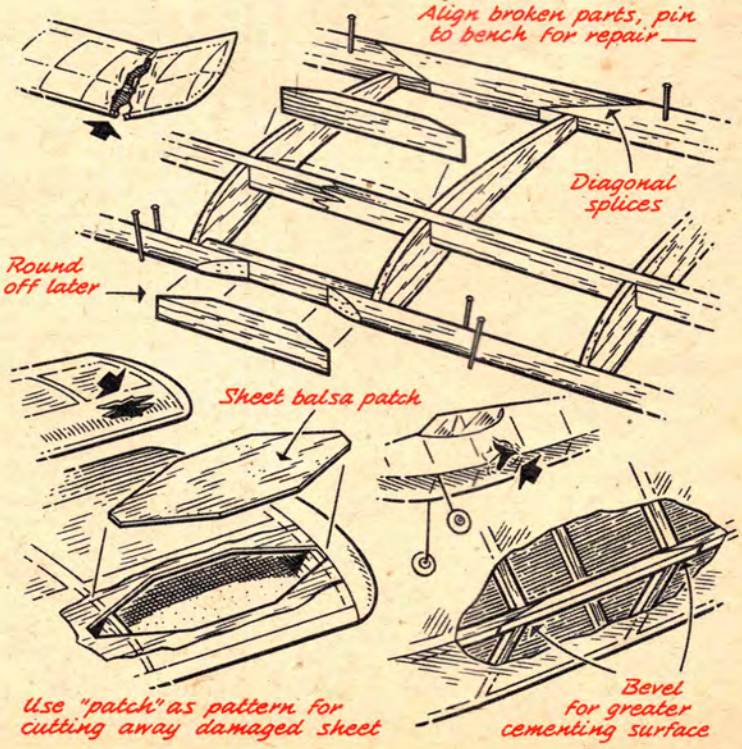
HOW TO Plank a Fuselage


Planked areas smoothed with sanding block
Composite sheet-planked fuselage...
Tapered here
Trim down
Alignment strips for top, bottom & sides
Tube spout notched to spread cement evenly along strips
Soft strip stock, 25% thicker than after final sanding

Fully planked fuselage can have compound curves throughout...

HOW TO Repair Model Structures


Align broken parts, pin to bench for repair
Diagonal splices
Round off later
Sheet balsa patch
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MAGAZINES

WANT—G-8, magazine. 1933—and 1934—$2.00 or more each in good condition. F. C. Heyer, Box 21, Gig Harbor, Washington.

(*Continued from page 73*)

and can include as many as you want. Other types of ships come in at a lower figure, of course, but insurance premiums are figured at 3% of the total, per year. Better write to the AMA, 1025 Connecticut Ave., Washington 6, D. C. for more info.

Since surplus sensitive relays are getting scarce, we are interested in new designs that look good for R/C. One of these is the Model 5529, made by Neomatic, Inc., Los Angeles 45, Calif. It may be had in resistances from 5 to 7250 ohms, and weighs half an ounce. It is really tiny and prices run up to about $7.00, depending upon resistance. They have been used in various types of R/C receivers with good results.

A new concern that will cater to the needs of the R/C fraternity, Precision Control Labs., Cleveland Heights 18, Ohio, has just brought out Catalog No. 101, listing many items such as relays, crystals, tubes, tools, resistors and condensers, and many other small parts, plus kits for transmitter power supplies, and receivers.

As we said at the beginning of this Column, the building season is now here. Shoot us pix and descriptions of any unusual planes, or equipment you may dream up.

—HOWARD G. MCENTEE

Western

(*Continued from page 63*)

in stunt, having almost twice as many points as the second-place Tracy Skyliners. The Capitol Screamliners have nosed out the Newark Club by two points in Beginners Accumulated Points, with the two clubs changing places this time. This emphasis on Beginners and their achievements is certainly the main reason this WAM organization is so strong and getting so big.

Up in the valley things are sure poppin'. Don't know whether it is the heat or not, but Fresno has started having night contests with lights on the models. Some fellows are having a little trouble, losing their ships when the lights go out and not recovering till the next morning. None had as much trouble as Ocie Randall, though. He says he was in such a rush to get out to the field to fly that he forgot the tail to his Zipper. Quickly he wired up his Little A Joe and then made the rest of the boys except one eat his dust; he finished second. Going to have another contest, Ocie?

Bakersfield and Fresno are having a team challenge meet at their next contest. We can remember some contests like this that we have attended, and know that times are usually very close, so close that the last flights made are often the deciding factors.

In past monthly contests we find Homer Werts posting high time at Fresno, and to keep honors in the family brother John posted over 24 minutes to cop honors at Bakersfield. At this same contest we were real pleased to note that the hard-working Francis Stewart won Class B.

At the Long Beach Thunderbugs' last monthly contest, we ran into a situation which is very unusual this day and age: a very big field which the fellows are allowed to have contests on. It seems like the first day they used it a big black Cad came cruising across to where they were flying. The guys expected this was it—no flying. Much to their surprise the driver got out, asked them what they were doing and then requested permission to examine the ships. Out of all this it was discovered that he had sons who at one time had built models, and he wondered if these were any different than the ones his sons had made. As a consequence the Thunderbugs have a good flying field, about 15 minutes out of town.

Their contest was well attended but the times were a little low. For some reason or another the contestants didn't start taking official flights till after the wind had started to come up, even though the timers were ready and waiting. As a consequence, no one had more than one maximum.

We saw that combination Sailplane and Cumulus, talking to Bob Hunter the build-

(*Continued on page 78*)

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PHILA. FLOATER

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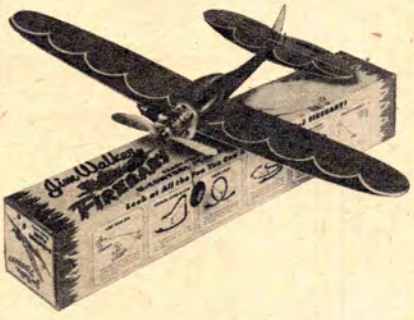

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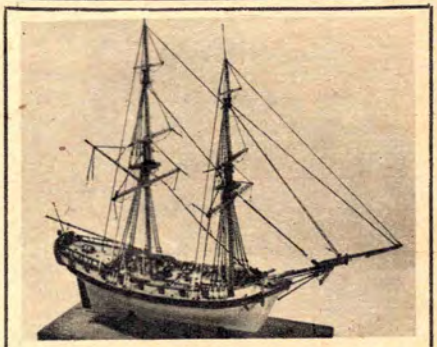

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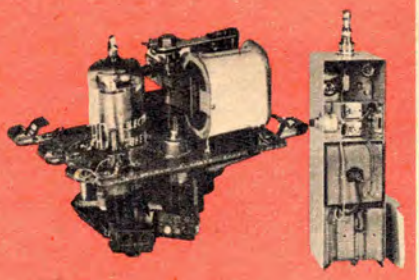

Vernon C. Macnabb has Citizen-Ship radio equipment for test-free 27¼ mc operation. New "27" LR radio receiver is $24.95; LC hand-held transmitter is $39.75. This is the concern which pioneered in the 465 mc band. Units are complete ready to install, not kits. No examination is required.

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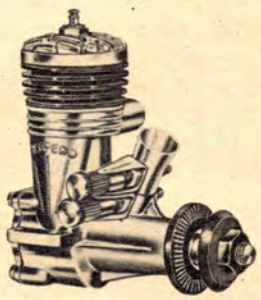

K & B establishes another first with the first two-speed glow ignition engine. This engine is equipped with two needle valves and is very practical for use where engine control is desired. Radio Control and other special events as the many carrier event is primarily the reason for the manufacture of this engine. Any reliable motor control unit may be used, however for radio control, K & B recommends the Bonner escapement shown on this page. The Torpedo .19 two-speed now is available at **$16.95**

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(*Continued from page 75*)

er. According to him, the ship is not too consistent, this being the first contest in which the ship made three official flights. Seems like some obstruction was coming up and hitting the ship at the other meets.

Quite a few models met their end that day. Bill Alford's sweet Torp .19 payload model dorked, after he switched to a .29 for Class B flights. Our Cumulus wing and tail on another fuse met its end here, just couldn't get our leg out of the way of the wing; it cocked, the crate dorked. Bobby Baxter's Hogan smashed to little bits, and Dick Werner piled his Beanburner in, though not too much damage.

We noted a little byplay take place which is certainly not good for the game. One of the juniors dorked his Half-A job, then borrowed one from an open contestant, wrong AMA number and all. When questioned about whether it was his or not he very soberly stated it was his model, after it had been put away. We can't help but feel sorry for the youngster when we realize that it is at a very early age he is being led away from the finer points of being a good clean sport. Wonder if he'll get the idea the rest of life is the same way, and do other things against the rules?

High time of the day and the Orwick .29 and trophy went to Rod Eschenburg of San Diego and his B Hogan. A junior, Duane Eisenbeiss, flew his Hogan to second. In Half-A "Ole Bill" Alford finished ahead of Tom Kirby by over 3 minutes. Clint Merrill won A, followed by Ole Bill again. In Class C the originals had it all over the kits, Harry Gould beating out Dick "Money Bags" Sladek by 5 seconds. First time in a long time Sladek didn't win a first place.

That Flying Wheels contest, the one so many Southern California modelers had been waiting for so long—longer even when the Junior Chamber decided not to sponsor the "All Westerns"—was just what the doctor ordered. It was a good day and a well-run meet in spite of the overflow of contest-hungry contestants. The meet started a little slow due to the reluctant modelers who wanted thermal conditions, but things sure got humming after Fran Uyematsu clocked his 10 maximum.

It seemed like old grad day when we ran across Mike Kostick, who will be remembered by some old-timers as one of the pioneer gas modelers from Akron who flew monstrous 10 and 12 foot ships in 1936 and 1937. Seems like Mike heard some engines run and smelled the fuel while a spectator at the Nats, and since then has built over a half dozen A/2 models. From what we can remember of him, we expect to see his name listed in the winners columns soon.

At this same contest it was sure nice to see Paul Gilliam back from "Texas", trunk of his car loaded with what models didn't blow out of the box on his way here. You should see the "baby pink" trim on his new ship.

Butch Corbly back from a six-month tour of duty in Pacific waters was also here, and as usual made his presence known with that Cyke-powered Sailplane. Wish he'd retire it and give the rest of the guys a chance. No matter how things go with all the rest of the ships, the Sailplane places.

Saw some rather unusual things take place. One real rare one was a ship folding a wing in a loop, only to be hit a fraction of a second later by a Spit-powered Sailplane amidships. Pieces of the folded wing ship littered the air. Sorry we can't say the Sailplane flew out of sight, but it did do over 3 minutes, a very good flight. Also saw one of the more prominent experts heave his model so hard in hand launching it that he folded his wing. Saw Bill Daniels attempt five take-offs, when the ship got off and immediately wound in to the left.

Real good also to see the originals present: Denny's "Ultra Hogan" with new geodetic wing, and Jack Oxley's good line of ships; Dan Lutz had out a new design of Mahieu's. Ronnie St. Jean brought out his wife for the first time. Bob Wiehle's new Half-A design very neat. The gang from Santa Barbara with Stan Hill's low CLA designs. Interesting, all of them.

When all the firing was over we had two new champions, fellows who will have to be reckoned with in the future. Harry

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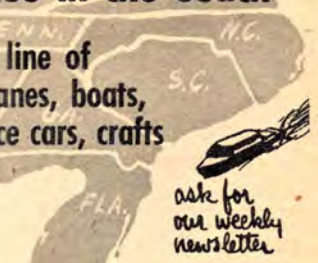

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152—Art Chester Racer U/C flying scale; Hot Canary jet speed; K. C. Cutie semi-scale F/F; Do'no' F/F A/2.

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Gould of the Thunderbugs was open sweepstakes winner and Duane Eisenbeiss won junior sweepstakes. Harry builds beautiful ships, usually yellow wing and tails with sprayed red trim which slowly blends to the overall color. Duane came along just a little too late for the Nats, for with the ships he has now he would have surely made quite an impression.

Fran Uyematsu won C gas followed by your correspondent, then Butch Corbly. Dick Werner flew his Beanburner to first in Class B with Tom Protheroe and Jack Oxley far behind. Class A was won by Jack Oxley, Harry Gould and Bob Banks followed in that order. Class A/2 was won by Duane Eisenbeiss, with J. Propeck and Phil Haines in second and third places.

The Flying Wheels certainly deserve praise for the swell contest they ran. When one takes in consideration the fact they don't fly in this meet themselves, he can't help but understand why this contest is so good. To Wally Short, Gene Huston Jr. and Sr., Jim Devitt and all the rest of you guys, thanks for a swell contest.

The Convair Aeromodelers are starting a course of instruction which will last for the next four months to help along the members who are new to the game. With fellows like Denny Davis, Jim Saftig, Gary Witt, Charlie Goodale and Walt Mooney as instructors we can expect a lot of top flyers in this club next season. They are at the present time formulating long-term plans for the next six months topped off with Half-A payload planned flight contests, and an Annual Contest.

"AT" Forum

(*Continued from page 52*)

Glow Plug Feed Ignition . . . You mentioned that when fuel is compressed in the cylinder, the ignition temperature is reduced until the fuel is ignited by the glow-plug. Please explain in detail how compression reduces the ignition temperature of the fuel and also more about the theory of glow

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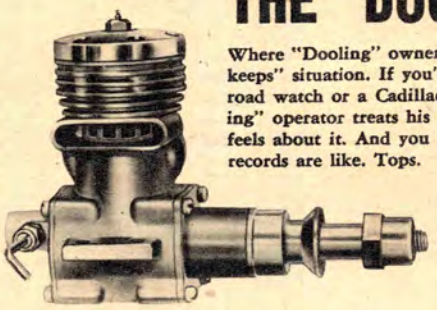

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AT 153

operation than is contained in this article.
Arthur Kubicz, Detroit, Mich.

• When an air-fuel mixture is compressed the oxygen becomes more concentrated, and causes burning to take place more rapidly and at a lower temperature. Another action taking place when fuel is compressed is an increase in temperature. This makes the mixture more readily ignited by the glow plug since it is closer to the ignition temperature of the fuel.

The exact action of glow plug engines is not thoroughly understood and has not been studied in a laboratory like gasoline engines because they are used only in models. The action of the glow plug, once the engine has started running, is similar to that of a chemical cigarette lighter. When platinum wire is exposed to vapors of methyl alcohol the wire glows at a red heat. This action, plus heat from the explosions, keeps the wire at a high enough temperature to ignite the fuel mixture for each explosion.

Diesel into Glow Plug . . . I have a Drone Diesel engine and I would like to convert it to a glow plug engine. Do you know if this has been done successfully, and if so, can you give me the details as to how?
Louis M. Schnebly, Circle, Mont.

• A glow plug conversion head was put on the market several years ago. You might purchase one through the Drone Repair Service or find one in a hobby store.

The Drone Diesel performs better as a diesel engine than as a converted glow plug engine.

Flying Scale Half-A's . . . I have been reading about scale free-flight such as F-51, P-40 etc. Are such models planked or are they Silkspan covered?
Robert Williams, Sherman, Tex.

• The really scale Half-A flying scales we saw were planked and then covered with very thin aluminum foil such as is obtainable in stationery stores and used to wrap packages. This was put on with rubber cement or dope. The final finish was beautiful. Simulated rivets are obtained with a small dull-pointed stick, dimpled before the foil was put on. They turned out to be very light.

YOU CAN ORDER

ANYTHING

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AMERICA'S HOBBY CENTER

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ADVERTISERS' INDEX

JANUARY, 1953

Ace Products 59
A-J Aircraft Co. 76
A & M Super Products 74
All American Model Motor Exchange 73
American Telasco, Ltd. 56
America's Hobby Center, Inc. 6, 7, 8, 9, 80
Arnold & Fox Engineering Co. 75
Atwood Mfg. Co. ..... 3d Cover
Atwood Dist. Co. 68

Berkeley Models, Inc. 82
Bonner Specialties 77
Brooklyn Hobby Den 79
Buzz & Doug's Hobby Shop 79

Cal-Aero Technical Institute 12
Cameron Precision Eng. Co. 61
Cavacraft Model Airplanes 66
Cleveland Model & Supply Co. 15
Comet Model Hobbycraft, Inc. 5
Consolidated Model Engineering Co. 81
Corr's 75
L. M. Cox Mfg. Co., Inc. 58
Craft Model & Hobby Industry 71
Crosby's Hobby Centre 79

Darwin Model Aircraft Co. 73
Dealers Hobby Supply 74
deBolt Model Engineering Co. 69
Dooling Bros. 79
Dumas Products 77
Dyna-Model Products, Inc. 62

The E and H Stores 70
Edwards' Hobbies 79
Electronic Specialty Supply Co. 77
Embry-Riddle School of Aviation 13
Empire Model Eng. Co. 65
Enterprise Model Aircraft & Supply Co., Inc. 73

F-B Model Aircraft 63
Fischer's Hobby Service 79
Forster Bros. 62
Francisco Laboratories 75
Frontier Mfg. Co. 77

Gotham Hobby Corp. 71
Great Western Mfg. Co. 77
Grish Bros. 57
Paul K. Guillow 11
Gull Model Airplane Co. 63, 72

Haw-Ki Hobby Supply Co. 68
Helicopters for Industry, Inc. 56
Henry Engineering Co. 55
Herkimer Tool & Model Works, Inc. ..... Back Cover
Hobby Decal Specialists 76
Howie's Hobby House 79

Ideal Models 71, 78
Indiana Technical College 70

Jameo (Jamaica Co. Hobbies, Inc.) 79
Joy Products Co., Inc. 71

K & B Mfg. Co. ..... 2nd Cover & 77
K & O Models, Inc. 53
Kenhi Model Products 77

Leitzsey Model Dist. 78

Vernon C. MacNabb Co. 16
Master Modelcraft 57
McManus Novelty Co. 76
Mercury Model Airplane Co. 59
Miniature Aircraft Corp. 72
Mod-Ad Agency, Inc. 6
Model Aeronautic Pubs. 79
Model Craft Hobbies, Ltd. 13
Model Shipways 76
Monarch Model Co., Inc. 71
Monogram Models 18
Mosby Hardware 79
Mutual Broadcasting System 69

National Model Distributors 67
Neplaco Wood Products 72
Northeast Hobby Dist. 78
Northrop Aeronautical Institute 10

Pactra Chemical Co. 81
Park Hobby Center 79
Parks College of Saint Louis University 3
PDQ Products Co. 61
Phil-leys 68
Pico Model Co. 79
Polk's Model Craft Hobbies 54
Precision Crystal Lab. 74

Quaker City Hobby Shop 79

Radio Control Headquarters 76
Russell Bros. Products 73

Scientific Model Airplane Co. 51
Sig Manufacturing Co. 70
Spartan School of Aeronautics 17
Speed-O-Lag Products Co., Inc. 67
Bob Steele Hobby Center 79
Sterling Models 58
Sullivan Products 64
Sunrise Products Co. 72

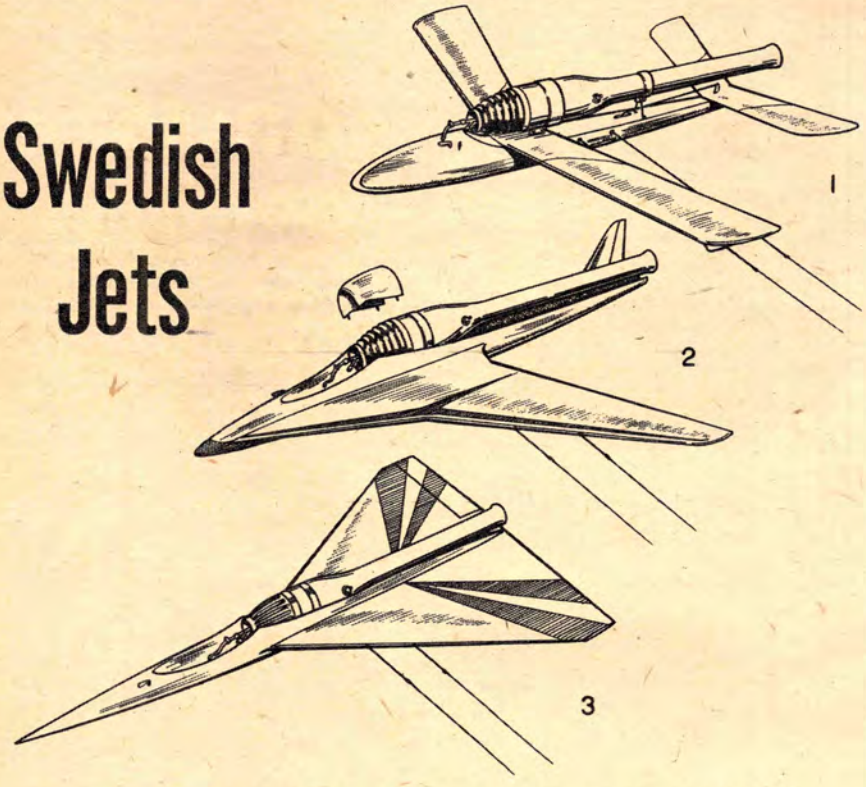
Testor Chemical Co. 60
Top Flite Models, Inc. 65
Sol Taubin's Model Store 79
Trost Modelcraft & Hobbies 72

Russ Webber's Tucson Train Shop 74
Wham-O Mfg. Co. 78
Wholesale Import Co. 78

Zenith Stamp Co. 78

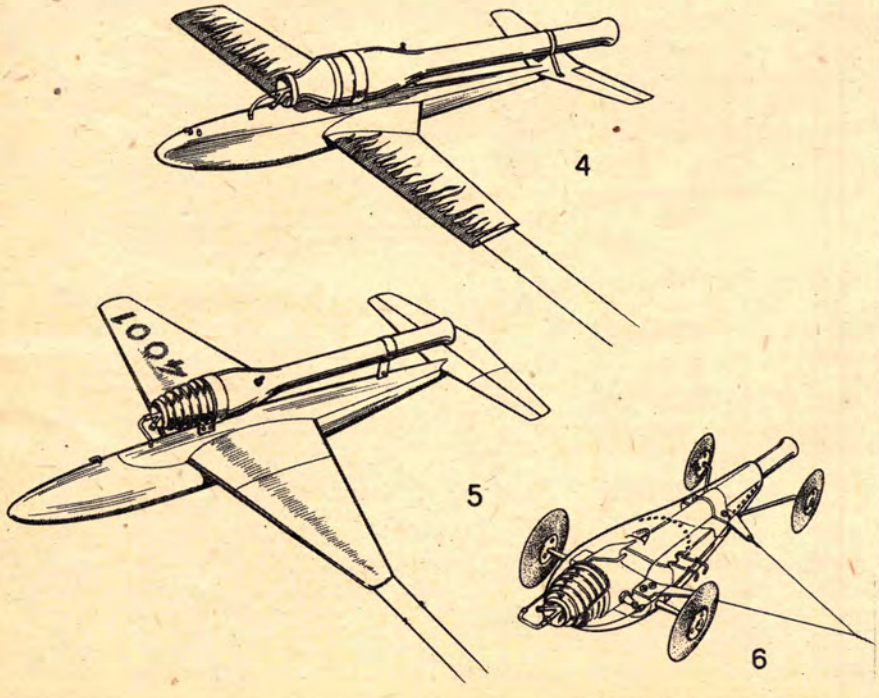
While every precaution is taken to insure accuracy we cannot guarantee against the possibility of an occasional change or omission in the preparation of this January 1953 Index.

Swedish Jets



■ All these remarkable "made in Sweden" models are powered by K-E Jansson pulse jets. The firm, located in Linköping, built #1, 2 and 3 as experimental models, also the race car. 1) Span, 18", length 23.5", symmetrical wing section, top speed 172 mph—planform inspired by XF-91. 2) Half-wing half-stab! Spans 17" wingtip to stab tip; length 29.5 in.; top speed 174 mph; wing is balsa with hardwood spar and very thin symmetrical section. 3) Under construction; span 16.5", length 31.5". Estimated top speed about 180 mph; cooling fins on valve head are longitudinally placed. 4) Designed by Lennart Andersson, it spans 16", has length of 21.5"; top speed 161 mph; flat bottom airfoil; note absence of cooling fins. 5) Biggest of these jets is this by Stig Markebo; spans 23.5", length 31.5"; Clark Y, does 149 mph. 6) Very fast race car with all-aluminum body; overall length 21.5"; wheelbase is 12.5"; track 8.5"; 3.5" dia. wheels; original caught fire, burned.

—Drawings and data by C. G. AHREMARK



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½" Scale
MODEL SAILBOAT KITS

Beautifully detailed models feature redi-carved hull, fittings, guy wire, die-cut wood parts, including stand. Quickly and easily assembled into an attractive model.

MOTH ...$1.50
SNIPE ...$1.95
COMET ..$1.95
STAR $2.50

LIGHTNING $2.50

½ A Flying Scale Models
With REDI-CARVED and HOLLOWED Fuselage!
P-51, Vo. Corsair, F.W. 190
TYPHOON, ZERO, SPITFIRE
$2.95 each

F.W. 190

Accurate ½" scale reproductions with cut-to-shape Wings, Stabs & Rudder plus All Hardware. Average span 18". Detailed plans for a really fine model.

ATTENTION Model-Builders: Send for our FREE 16 page circular with complete description of kits and accessories!

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If you're proud of your ship keep it bright with new Aero Gloss plane kleener

SAFE ON ANY SURFACE SAVES ANY SURFACE

Aero Gloss has it again! The line that keeps up with modelers' needs now offers a new plane cleaner that removes ALL kinds of dust, mud, grease, oil, fuel, etc. *safely* and *surely*. Keep your plane looking ever-new — try it today — At Your Dealer's.

8 oz. Can, 50¢.

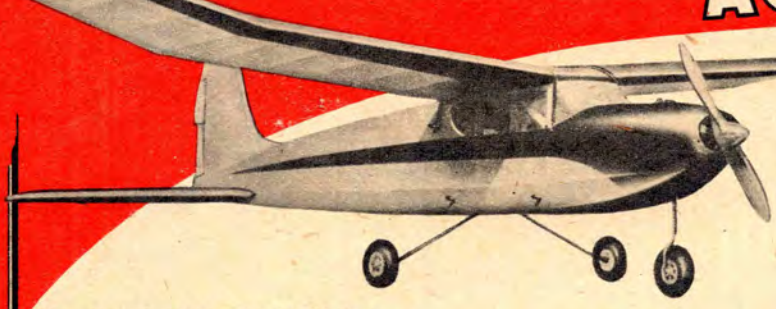
pactra CHEMICAL COMPANY

1213 North Highland Ave. Los Angeles 38 California

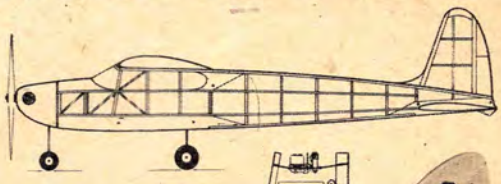
Most Complete Line of Model Finishes

Berkeley's RADIO CONTROL

PLANES... UNITS... ACCESSORIES...



The Radio Units and Kits presented here have each been re-designed three or more times. This permits us to offer you a time-tested, yet timely product. We prefer this to meaningless sensationalism in our advertising.



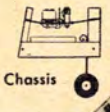
Newest in our line of Radio, PAA-Load designs, is this model by Henry Struck. Radio Chassis including batteries is removable as a unit. Split rudder tab for separate trim adjustments. Clip-in prone engine mount, tri-cycle gear.

BOOTSTRAPS "A-RC"

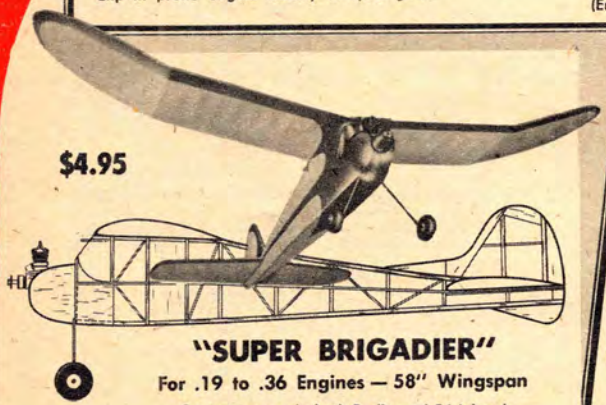
For .09 to .14 Engines — 54" Wingspan

(Empty weight 21 oz. — Radio, Equip., 14 oz. max.)

$3.95



Radio Chassis

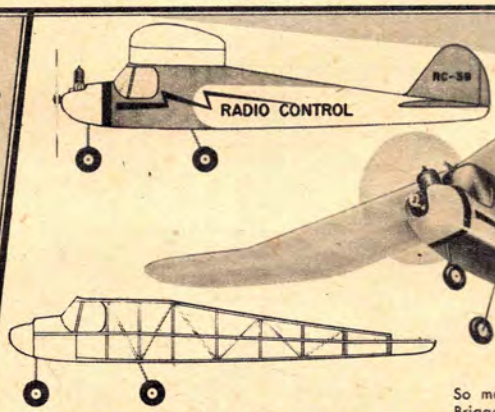


$4.95

"SUPER BRIGADIER"

For .19 to .36 Engines — 58" Wingspan

Contest proven in both Radio and PAA-Load events, this rugged model is easy to build, adjust, and fly. Designed by Henry Struck, pre-fabricated kit includes complete Radio Control and PAA-Load installation drawings.



$1.95

BRIGADIER "RC-38"

For .035 to .099 Engines — 38" Wingspan

So many model builders converted the old Brigadier "38" kits into Radio jobs, we have now re-designed the kit especially for Radio Control or PAA-Load flying. Plans include Radio installation details. Die-cut parts.

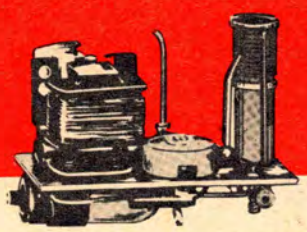
"SUPER AEROTROL" 27mc. Crystal Control Radio Control

Now Available

SUPER AEROTROL ASSEMBLED UNITS...

Super Aerotrol RECEIVER $21.95 tubes included

Super Aerotrol TRANSMITTER $27.95



NO OPERATORS LICENSE REQUIRED!

First Transmitter You Can *Build, Operate, Maintain*

Ready-to-Assemble Kits...

DUST-CORE TUNED Super Aerotrol RECEIVER

- NEW "locked-channel" dust-core tuning. (We have shipped the sample receivers across the country and to Europe without the frequency changing!
- Light in Weight, 2¾ oz. less batteries.
- Simple super-regenerator circuit, 100% dependable.

Kit includes: Finished, tested sensitive relay; finished dust-core tuner; drilled bakelite base with condensers and eyelets attached; all electrical components, condensers, resistors, coils, chokes and potentiometer; all necessary contacts, and color-coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included.

Kit (less tube)... **$13.95**

***Crystal-Controlled* Super Aerotrol TRANSMITTER**

- Completely portable — Self contained — No separate antenna — No external Batteries! • Operates on 27.255 mc. • Weighs 3.5 lbs.

Kit includes all necessary parts (except tube and batteries): Precision Ground Crystal; Pointed Metal Cabinet; Finished Sectional Antenna; stamped and formed chassis with all holes punched; all necessary components, resistors, condensers, coils and chokes; color coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included —

Kit (less tube)... **$21.95**

DE-Aerotrol (for 52 mc.) **Complete Kit — $22.95**

Includes Transmitter, Receiver, Escapement (less batteries and tubes).

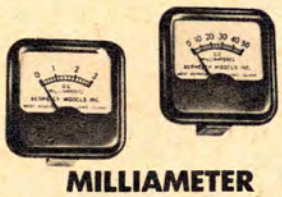
XFG-1	Receiver Tube	$3.50
3A5	Transmitter Tube	3.50

*Prices and specifications subject to change.

Assembled only... **$3.95**

ESCAPEMENT

Entirely new and different! Rugged yet compact. Single hole mount. Draws 2-5 times *less* current. Operated by rubber power, it will deliver at least twice the control operating force of other escapements without "skipping." Completely self-neutralizing, it returns the control to neutral after the signal stops.



MILLIAMETER

O- 3 Milliameter	$3.50
O-50 Milliameter	2.75

Low in cost, manufactured specifically for use with Super Aerotrol. O-3 Milliameter for use with Super Aerotrol Receiver. O-50 Milliameter for use with Super Aerotrol Transmitter.

SOLD THRU BERKELEY DEALERS & DISTRIBUTORS

If no local dealer is convenient, mail orders will be filled by Berkeley Model Supplies, Dept. AT., West Hempstead, N. Y. Please include 25¢ packing & postage.

Berkeley's CATALOG

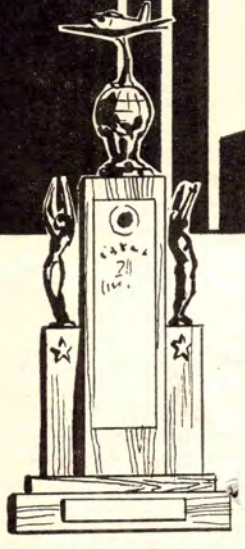
25¢ Completely revised — up to date! Contains complete line of kits, Supplies, Accessories, Information.

WOW! WASP WINS

READ ALL ABOUT IT!

MAKES CLEAN SWEEP!

ALL ½A EVENTS!



SETS TWO NEW A. M. A. RECORDS

....at the 1952 "NATIONALS"

National Model Airplane Championships at Los Alamitos and Santa Ana, Calif.

Yes, WASP .049 engines had a field day and "stole the show" at the official A.M.A sanctioned. 1952 Championships. With contestants from all over the nation competing, WASP-powered planes took first in every 1/2 A event, most of the 2nd's, 3rd's, and all other places—and set 2 new A.M.A. records. This against the "stiffest" possible competition *ever*. Check the partial list below and see for yourself we've proved everything we've been saying about this favorite performance-tested power plant of winning contestants. See your dealer for your WASP *today*—and join the "winners circle" *tomorrow!*

The Mighty Midget that "did it"!

Wasp .049 **DISPLACEMENT**

Here is How WASP-POWERED *Planes Placed:*

FREE FLIGHT GAS — CLASS 1/2 A — OPEN
FIRST six places.

FREE FLIGHT GAS — CLASS 1/2 A — SENIOR
FIRST—plus other places.

FREE FLIGHT GAS — CLASS 1/2 A — JUNIOR
FIRST—plus other places.

FREE FLIGHT GAS — ROW — SENIOR
FIRST place. *New record set.*

FREE FLIGHT GAS — 1/2 A — SCALE
FIRST—plus other places.

U. S. NAVY CARRIER — CONTROL LINE
FIRST place (twin-engine powered).

P. A. A. LOAD — CLASS 1/2 A
FIRST, Third and Fourth.

P. A. A. CLIPPER CARGO — CLASS 1/2 A
FIRST — 17 1/4 ozs. plus 4 oz. dummy. *New record set.*

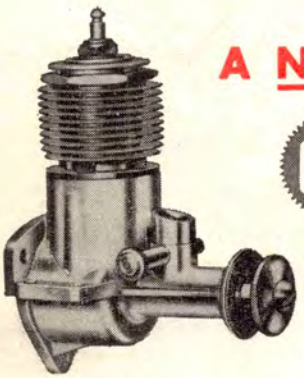
Above is a partial list of known "Winners with Wasp" compiled to the best of our knowledge and belief. Watch for a more complete list in future ads.

TO BE A WINNER
Get a WASP!

ATWOOD MANUFACTURING CO. • PICO, CALIF.

announcing 2 NEW OK CUBS

A NEW DISPLACEMENT!



OK CUB .14

Produced at the request of top plane designers! Opens an entirely new field for the hobbyist. A light-weight engine with the extra power so often needed. For free flight, control line and radio controlled flying.

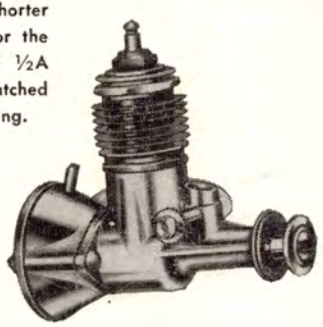
CLASS A

Displ.	.149	RPM	3,000 to 15,000
Bore	.600	Weight	2¾ oz.
Stroke	.530	Price	only **$8.95**

A NEW CUB FOR THE EXPERT!

OK CUB .049X Combination Package

Companion to the famous .049 Cub. Provides higher output due to shorter stroke, larger bore, lighter weight. Designed for the advanced hobbyist. The top performer in the ½A Class. Package includes assembled engine, matched prop, extra rear cover, fuel tank, neoprene tubing.



CLASS ½A

Displ.	.049
Bore	.420
Stroke	.360
RPM	3,000 to 15,000
Price	only **$6.25** Complete

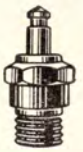
SEE YOUR DEALER . . . Or write us direct

For PRICE, POWER, and PERFORMANCE

15TH ANNIVERSARY OK 1937 * 1952

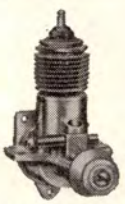
A Complete Line of PROVEN Miniature Engines and Accessories

O. K. GLOW FUEL
Pint 85¢



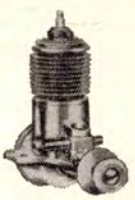
O. K. PLUGS
Short or long — 59¢

O. K. CUB .049
POWER KIT
"Assemble-it-Yourself"
$4.95

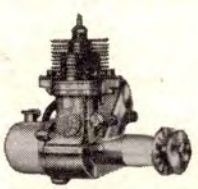


O. K. CUB .049
$5.25

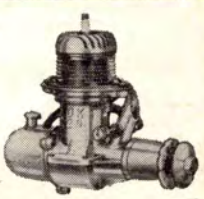
O. K. CUB .074
$5.95



O. K. CUB .099
$6.95



O. K. MOHAWK CHIEF
$9.95



O. K. HOTHEAD
$10.95

O. K. COMBINATION PACKAGES

CUB .039	$4.95
CUB .049	$5.75
CUB .074	$6.75
CUB .099	$7.75

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